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AN

ESSAY

ON

Stereotype Printing;

INCLUDING A

DESCRIPTION OF THE VARIOUS PROCESSES.

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AN ESSAY ON THE ORIGIN AND PROGRESS OF Stereotype Printing;

INCLUDING
A DESCRIPTION
OF THE
VARIOUS PROCESSES.

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BY THOMAS HODGSON.

Newcastle:
PRINTED BY AND FOR S. HODGSON, UNION-STREET,
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[illegible]

Dec 9, 1861

TO

THE MEMBERS

OF THE

Literary and Philosophical Society,

OF

NEWCASTLE UPON TYNE,

THIS ESSAY

IS MOST RESPECTFULLY INSCRIBED

BY THEIR OBLIGED SERVANT,

THOS. HODGSON.

Advertisement.

The Writer of the following pages can lay claim to little merit beyond that of collecting, into one publication, a variety of information, which either lay scattered in different works, or was unknown to the generality of English readers. Whilst pursuing some enquiries nearly connected with this subject, it struck him as singular, that whilst almost every other branch of the typographic art had been the subject of so much curious research and minute description, Stereotype Printing, notwithstanding the public curiosity it has of late years excited, should never yet have been fully and accurately described,—and that so great a want of information, with respect to its history and to the nature of its processes, should prevail, not only amongst the generality of the public, but also amongst those writers, who have either spoken of it incidentally, or treated of it more professedly. It, therefore, appeared to him, that a work, which should give an account of the origin and progress of this art, and should shortly, yet satisfactorily, describe its several processes, might prove not an unacceptable addition to English literature. Under this impression the present work was undertaken, and it has been the Writer's object to convey every information in his power in as clear and simple a manner as possible; if, in the description of any of the processes, he should not have succeeded in rendering his meaning perfectly obvious, he hopes his readers will make due allowances for the difficulty of accurately explaining, without the aid of plates, all the manipulations of complicated processes, and also of clearly rendering the sense of descriptions in themselves obscure and often not easily intelligible.

Although this work is merely designated an essay on the origin and progress of *Stereotype Printing*, which strictly speaking would only imply an account of those operations and their results, the object of which is to multiply writing or designs by the operations of letter-press printing; it will be found upon perusal, that the Writer has also included in his enquiry the history and description of the sister art of *Polytype Printing*, or of the art of producing by mechanical means, from engraved plates or otherwise, any number of plates capable of multiplying writing or designs by the operations of copper-plate printing.* These arts are so connected, and the processes, which have been used in the one, have often so great an alliance with those of the other, that it would have been neither easy nor proper to separate the account of them. The enquiry besides, which has been lately instituted into the possibility of preventing the forgery of bank notes, has rendered the art of Polytype Printing particularly interesting at the present moment; for it seems to be well established, that, wherever the issue of such notes is any way extensive, all plans for the prevention of forgery must fail of their intended object, if they do not afford the power of supplying, with facility and dispatch, the requisite number of perfectly identical plates. This identity and quick supply can only be attained by Stereotype or Polytype Printing.

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* Should this work by chance fall into the hands of any one, to whom the difference between letter-press and copper-plate printing is unknown, he is referred to any Encyclopedia, for an explanation. In the mean time, it will be sufficient to bear in mind, that every thing, intended to be submitted to the operations of letter-press printing, must be in relief, and that the degree of pressure, necessary to take off an impression, is generally given by means of a screw; and that every thing, intended for copper-plate printing, must be engraved *en creux*, and that the necessary pressure is given by the plate being passed between two rollers.

The Writer has been careful on all occasions to specify the sources from whence he derived his information. The principal amongst these, it will be seen, are the memoirs, which were written on this subject, by the late M. Camus. The ample details, which he has left, contain the most complete and satisfactory account of the progress of this art upon the continent, and particularly in France. Of the valuable and curious information, which he collected, the Writer of the present Essay has not failed to avail himself; and he trusts, that whilst he has endeavoured to discard as much of the minuteness of description and remark of M. Camus as possible, he has not omitted to notice a single fact of importance. Those parts, for which no authority is mentioned, he has derived either from the private communications of others, or from his own sources of information. Such of his own immediate friends as have assisted him, either with their suggestions or communications, he begs to accept his warm acknowledgments; but to Mr. Tilloch, of London, and Messrs. Wilson, of Glasgow, he feels himself particularly indebted for the extreme readiness, with which they complied with his requests, and he derives peculiar satisfaction from thus publicly expressing his sense of their kindness.

T. H.

Newcastle, August 1, 1820.

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AN

ESSAY

ON

Stereotype Printing.

Although the origin of printing is involved in great obscurity, and it is uncertain to what ingenious individual we are indebted for so invaluable a discovery, it is abundantly manifest from all concurrent testimony, that the first productions of the art were impressions taken from blocks of wood, whereon the matter, of which it was desired to have the impression, was engraved in relief. The earliest of these productions consisted of rude figures of saints and scripture characters, or of curious graphic illustrations of some passage in scripture, with a few words or short sentences usually attached. The art of speedily multiplying copies of figures and writing having thus been acquired, the transition to the printing of books was natural and easy. In a very short period some of the works, which at that time were in the greatest demand, such as short manuals of devotion, and elementary treatises of education, were ushered into the world by means of this newly invented process; and as these works were of inconsiderable extent, and the demand for them regular, the disadvantages and inconveniences, attending such an imperfect mode of printing, were probably not at first much felt. Indeed for such works, block-printing possessed a considerable advantage, for the blocks, having once been engraved, were easily preserved, and impressions could at any time be speedily taken from them to meet the demands of trade; whilst the inconvenience and expense, of being obliged to take off at once a large number of copies, were avoided.

But when it was attempted to apply the art of block-printing to works of any great extent, the inconveniences, to which it was subject, were found considerably to overbalance any advantage it might possess. For the block, from which the impression of each page was to be taken, being composed of a single piece of wood, could only be applied to the printing of the particular page which it designated, and it hence became necessary to engrave a block for each page of the work. The labour and expense, which such a proceeding required, must have been so great as to have have completely prevented the application of this art to all books of any considerable magnitude.

By the happy discovery, however, of the practicability of forming pages of a number of separate letters, or types, which, after having been used in the printing of one sheet of a work, might then be separated from each other, and used in the composition of another sheet, all the inconveniences and difficulties to which the art of printing had hitherto been subject, were overcome; and no longer impeded in its progress, nor circumscribed in its utility, it was rapidly diffused, and successfully applied to the publication of most extensive and important works. In the course of fifty years after this discovery, this art was known and practised in most of the principal cities of Europe, and the numerous and splendid publications, which in that short period issued from the press, attest both the perfection, to which the art had attained, and the eagerness, with which books were sought after and read.*

But though the obstacles which prevented the application of the art of block-printing to the publication of books in general, were removed by the discovery of printing with moveable characters, the peculiar advantage, which, as has been said, the former art possessed, was entirely lost. For it being requisite, that the characters, or types, which were used in the composition of one sheet of a work, should be separated from each other in order to be used in the composition of another sheet, the pages could no longer be preserved entire, ready for use whenever they might be wanted. It became therefore necessary, before such separation took place, that the whole number of copies, of which it was wished that the edition should consist, should be printed off at once. As the expense of such composition was considerable, and as the same expense must necessarily be again incurred upon every new edition, this number was consequently required to be of such an extent, as both to defray the expenses of publication, and to prevent the necessity of a new edition for a certain number of years.—When literature and science advanced, and the trade in books assumed a regular character, the advance of capital necessary for this purpose, began to be felt as a great inconvenience. This was more particularly the case with regard to such books as the bible, the classics, &c. &c. of which the sale, without being perhaps very rapid, was yet regular, and the demand for them certain to continue. The bookseller, therefore, calculating the capital, which it was necessary to advance both to defray the expense of composition, and the other charges of printing, as as well as the value of the paper for an edition, sufficient to supply the demand for any certain period, —contemplating also the charge and risk of preserving such a number of copies in good condition, —and well aware that a similar cost and advance would be incurred upon every subsequent edition,—began naturally to feel how beneficial it would be, were a mode discovered, which, at the same time that it would relieve him from the necessity of advancing capital for large editions, might enable him to print smaller ones, as often as the demand for them required it, without incurring the expense of re-composition every time that such works passed through the press.

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* It is asserted by Santander, that at least 15,000 editions of different books were published during the 15th century.

Some of these advantages, it was obvious, would be perfectly attained by preventing the types, when once set up into pages, from being again separated. But such a mode of proceeding required an immense quantity of types, and the value of these being very considerable, it must evidently have occasioned, at the outset, an advance of capital, greater even than that which it was the object to avoid, and which must have prevented it from being very generally practised. By some large establishments, however, possessed of ample funds, and of a great quantity of printing types, it was adopted. At the printing office of the Orphan House at Halle in Saxony, we are assured by Jordan, that the types, forming the pages of the bible and some books of devotion, were kept constantly standing; and that this celebrated establishment was thus enabled to sell these books at a much cheaper rate than they could be procured for at any other place.* There is, indeed, reason to suppose, that this mode was practised to a greater extent, than is generally known. It was, I believe, by no means uncommon in the printing offices of the Universities of England and Scotland; at least I know for certain, that the school copy of the bible and testament was kept standing in the office of his Majesty's Printers, under the late patent, for Scotland; and there are many minor establishments, which, even at the present day, employ their half-worn types in preserving the forms of popular school books.

As the pages, which are preserved in this manner, are constantly liable to become incorrect, by the letters being misplaced or dropping out, during the operations they necessarily undergo every time they are used, a mode of remedying this inconvenience suggested itself, about the beginning of the eighteenth century, to an artist of Holland, named J. Van der Mey, the father of the well-known painter of that name. This mode, which may be considered an intermediate link between the operations of common letter-press printing and those of stereotype, as practised at the present day, consisted in immersing the bottoms of the types, after the pages had been composed, and made quite correct, nearly up to the shoulder of the letter, in melted lead or solder; thus rendering the page one solid mass. In this manner, Van der Mey prepared for Samuel Luchtmans, bookseller of Leyden, the pages of a quarto and folio edition of the bible and of some other books. The way in which he prepared his pages having been misunderstood, or unknown to all the English writers who have yet noticed this subject, this artist has been constantly represented as the inventor of stereotype printing, in the usual acceptation of that term, an honour to which he is certainly not entitled. The authority, on which I have ventured to give the above explanation of the process pursued by Van der Mey, is a letter dated Leyden, June 24, 1801, addressed by Messrs. S. and J. Luchtmans, booksellers of that city, to M. Renouard, of Paris. As this letter is very interesting, both on account of this explanation, and also for the notice it contains of the works on which this process was employed,

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* Jordan, *Voyage Litteraire*, page 6.

I here insert a translation of it as published by M. Camus.*

"We have sent you a copy of our stereotype bible, which we take the liberty of offering you as a work truly interesting in regard to the history of the art. All the plates of it are now in our possession, and notwithstanding that many thousand copies have been printed from them, they are still in very good condition. They are formed by soldering the bottoms of common printing types together, with some melted substance, to the thickness of about three quires of writing paper.† The plates were made, about the beginning of the last century, by an artist, named Van der Mey, at the cost of our late grandfather, Samuel Luchtmans, bookseller. The same artist, at the same time and in the same manner, also prepared for our grandfather the stereotype plates of a folio Dutch bible; these plates are at present in possession of the bookseller Elwe; and afterwards of a Greek new testament, on brevier, and of 24mo. size, the plates of which are still preserved by us. The last work, which this artist executed in this manner, was the *Novum Testamentum Syriacum et Lexicon Syriacum*, by Schauf, 2 volumes, 4to. a work sufficiently known. The plates of this last work have been destroyed. These instances comprise, as far as our knowledge extends, all the attempts of this kind which have yet been made in this country."

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* Camus, *Histoire de la Stéréotypie*, edit. an x. (1802) 8vo. page 9.

† The words of the letter are, "c'est une réunion des caractères ordinaires par le pied, avec de la matière fondue, de l'épaisseur d'environ trois mains de papier à écrire."

This letter satisfactorily explains the nature of the process pursued by Van der Mey, and proves, that the doubts, which have been expressed respecting his right to the appellation of the inventor of stereotype printing, were not entertained without foundation. The misconception, which has arisen on the subject, has been chiefly occasioned by the incorrect statement which appeared in the *Niew Algemein Konst en Letter Bode*, for 1798. In this statement, of which a translation will be found in the tenth volume of the *Philosophical Magazine*, page 276, Van der Mey is represented as having "prepared and *cast the plates*,"—an expression, which certainly is not warranted by the fact. This statement is also incorrect, with regard to the works, on which the process was employed. It likewise describes the margins of the folio bible as being ornamented with figures; but Mr. Dibdin, in noticing a copy of the work in the possession of Mr. R. P. Cruden, does not say a word about these figures. He describes it as being "printed in a handsome black letter, in double columns, with marginal annotations in black letter, of at least three sizes smaller. The paper is of a beautiful tone and texture, and it may in every respect be considered as an interesting curiosity."* It was published at Leyden, in 1718, by T. Muller, C. Boutesteyn, and S. Luchtmans, in two volumes, folio.

A somewhat similar process, if we can place reliance on the evidence on which it is related, seems to have been practised by Athias, a Jew of Amsterdam. Lelong, at page 433 of his *Bibliotheca Sacra*, which was published in 1723, states, that Claud. Othius had been informed by a printer of Zurich (David Gesner), that Athias had executed at a great expense, in what year is unknown, an English bible, of which he preserved all the forms of the types, in such a manner that nothing could be added to, nor taken from them. Gesner, who was the first that related this fact, adds, that he had seen these solid forms carefully preserved in several presses.† It is generally stated, that Athias ruined himself by this speculation.

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* *Bibliographical Decameron*, vol. ii. page 343. By black letter, I presume, Mr. Dibdin here means the common gothic character, in which all Dutch and German books are printed.

† Lambinet, *Origine de l'Imprimerie*, tom. ii. p. 336.

Though the two methods, which have already been noticed, might afford some of the advantages proposed, they could not by any means answer the expectations, or supply the wants, of the trade in general; as some of the inconveniences, which it was wished to avoid, particularly the great advance of capital, were thereby greatly aggravated. To endeavour to obtain all the objects in view, other measures, must, therefore, be had recourse to. It seems to have been early conceived by those, who turned their attention to this subject, that as the types were fac-similes of the punches, by which the matrices, in which they were cast, were formed, it would not be impracticable to obtain from the types themselves, when set up into pages, a matrice or mould, in which plates might afterwards be cast, which would present, in one solid piece, an exact fac-simile of the face of the page. By such a plan, it was obvious, could it be carried into effect, that many of the desired advantages would be attained; as the solid plates, which would be the product of the operation, would possess the advantage of being preserved ready for use, whenever they might be wanted; and though the operation would naturally be attended with some expense, yet as the plates might be formed of only a moderate thickness, and as the types would neither be constantly occupied, nor destroyed by the process, the expense would be but trifling, when compared with that incurred in either of the modes, which have already been noticed. But this plan, though apparently easy in conception, was found to be attended with great difficulties, when attempted to be carried into execution. Various attempts of this kind have been made with various success; of these attempts, and of the processes employed, as far as they can be ascertained, I shall now proceed to give an account, preserving as nearly as possible a chronological order.

It is not precisely known at what time, or in what country, attempts in this new line of art were first made and successfully put in practice. In this state of uncertainty, the French writers on the subject have boldly attributed to their own country any honour, which may result from this invention; but it may with reason be asserted, that their pretensions are at least equivocal. Lottin assures us, that, about the end of the seventeenth century, plates, cast in a mould taken from the pages, were used at Paris for printing the calendars placed at the beginning of prayer and other liturgical books; and that these plates were used in the eighteenth century by a printer of Paris, named Valleyre.[*] If we could give credit to this assertion, the point of priority, so far as is known, must undoubtedly be yielded to the French, but Camus candidly acknowledges, that he does not know upon what authority Lottin has fixed upon the end of the seventeenth century as the period, when these plates were first used. He has never, he says, been able to meet with any of the books, in which these plates were used, and cannot therefore avail himself of the authority, which the date of the edition might have afforded, for fixing the precise period of their use; but he states, that an old journeyman compositor positively asserted, that he had been a witness to the use of these plates by Valleyre, before the year 1735.[†] But this date falls far short of the antiquity claimed by Lottin.

Though the exact time, however, when these plates were first used, may be involved in some uncertainty, none can attach to the fact of the existence of the plates themselves; Camus, in his *Histoire de la Stéréotypie*, gives an impression taken from one of these plates now in the possession of Firmin Didot, and notices two others in the possession of

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[*] Lottin, *Catalogue des Imprimeurs de Paris*, partie alphabetique, p. 87.

[†] Camus, *Hist. de la Stér.* p. 16.

Herhan. The specimen which he gives, contains the calendars for March and April, divided in two columns by a row of rude flowers. He also describes, at some length, the plate, from which the specimen is taken. It is formed, he says, of copper, and is 3½ inches long, by 2 inches broad, and about one-seventh of an inch thick. From the roughness of the casting, it has evidently, he thinks, been cast in a mould formed of sand or clay. The specimen, indeed, sufficiently attests the rude and imperfect mode by which it must have been executed; none of the letters is sharp and full formed; many of them are imperfect, and some have not *come* at all in the casting. After the plate has been cast, the back of it has been dressed with a file, in order that it might bear equally in every part upon a block of wood, to which it has been attached by pins, the marks of which, and even the remains, are still evident.* The plates, in the possession of Herhan, comprise the calendars for January and February, and for November and December.† From the circumstance of the columns being separated by rows of flowers, different from those in the plate possessed by Didot, Camus is of opinion, that they have belonged to a different edition; but this is by no means conclusive evidence of such a circumstance, as printers at that time did not pay much attention to the preservation of uniformity. They have evidently besides been formed from the same types, and their style of execution is perfectly similar.*

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* Camus, *Hist. de la Stér.* pages 14 and 15.

† A specimen of these two plates is given by M. Lambinet, in his *Histoire Succincte de la Stéréotypie*, in the 2d volume of his *Origine de l'Imprimerie*, page 341.

Such is the evidence, upon which the French writers have ventured to attribute to their own country the honour of this invention; and though it is certainly far from being satisfactory, yet in the absence of all testimony of a positively opposite tendency, courtesy perhaps requires, that, if their pretensions cannot be unhesitatingly admitted, priority of notice should be acceded to them. The statement of Lottin, that these plates were used before the end of the seventeenth century, appears to be entirely unsupported; whilst the circumstance, of not a single copy of any book, in which they were used, having ever been met with, would, if it were not for the assertion of the old journeyman compositor, lead us to consider them as an attempt, and that not a very successful one, towards the art of stereotype printing. But as this person asserts, that he had witnessed the use of these plates by Valleyre, before the year 1735, I shall not attempt to dispute the fact, that the calendars, at the beginning of some church-books, were printed by Valleyre from a set of stereotype plates. It may, however, I think, be permitted to doubt, whether the memory of any person, after a lapse of 65 years, could be so tenacious, as to enable him to fix, with accuracy, the date of a circumstance, which must have occurred on his first introduction to business, and when it is not very likely, that it would greatly excite his attention.* It is, therefore, probable, that he may have made some mistake in the year, and that a later date than 1735 should be fixed upon. But even admitting this date to the fullest extent, I can see very little reason (as the assertion of Lottin is quite unsupported, and almost given up by his own countrymen,) for concluding, that this rude attempt of Valleyre was prior, in point of time, to that which I am next called upon to record, and which was made in Scotland. This was no rude and unsuccessful effort; and if to other countries must be yielded the merit of having made the first attempt, to Scotland, and to a Scottish artist, is due the honour of having both discovered the art, and produced the first complete works, printed solely with stereotype plates. The name of this ingenious artist was William Ged, a goldsmith, in Edinburgh. Of his proceedings and misfortunes, in his attempt to carry his invention into practical effect, an account,

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* As a means of distinguishing, from amongst the books of hours printed by Valleyre, those in which these plates were made use of, Camus remarks, that, in the calendar for March, the name of St. Gregory, at the date of the 12th of March, is spelt *Gregooire*, instead of *Gregoire*. In the calendar for January and February, there is a colon placed horizontally beneath the 20th, and another similarly placed after the 25th, flower dividing the columns. In that for November, a point is wanting after the *s* preceding the name of Clement, on the 23d of November.

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* No mention was made of the information, obtained from this workman, in Camus's *Histoire*, when read before the National Institute in 1798, nor as published in the third volume of their *Memoires*, printed in 1801. It is contained in a note in the octavo edition, published in 1802. It is, therefore, evident, that he must have obtained this information between 1798 and 1802, and probably between 1801 and 1802,—a distance of more than 65 years from the period, at which these plates were said to have been used; and the words he employs, in speaking of the workman, shew, that he obtained this information about the

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time, when he was writing—" un ouvrier compositeur, employé chez Baudouin, *assure* avoir été témoin de l'usage de ces planches chez Valleyre avant 1735." Supposing this person to have been about 15 years of age, when he witnessed the use of these plates, he must have been upwards of 80, when he gave this information, —a somewhat extraordinary age for a journeyman compositor to be still working at his business. Camus does not say, that he had himself learned this fact from the man; but if he obtained it from any other person, there is the greater probability, that some mistake has been made in the date of the year.

of which the following is rather a copious abstract, was published about 40 years ago.*

It appears from this narrative, that in the year 1725, in consequence of a conversation, which he had with a printer, the attention of Ged was strongly attracted to the practicability of forming plates from types, when composed into pages. Having been furnished with a page, he instituted a series of experiments, and at last, after two year's labour, and after having incurred great expense, he succeeded in producing plates, impressions from which could not be distinguished from those taken from types; but in this attempt his own funds were exhausted, and in order to prosecute his invention, he entered into a contract with a gentleman, who, for a fourth share of the profits, agreed to make the necessary advances of capital for carrying on the work. Both of them, it appears, were ignorant of the printing business, and the disheartening representations, made by those already established in the trade, so intimidated Ged's friend, that, at the end of two years, he had advanced only £22. Under these circumstances, Ged procured the renunciation of this contract, and in July, 1729, entered into another with Mr. Fenner, a stationer of London, who happened to be at that time in Edinburgh. By this last mentioned contract Ged engaged, in consideration of Fenner advancing the capital that might be necessary, to grant him half the profits, that might arise, and to communicate to him the secret of the art; and Fenner was moreover "obliged four months after date to have a house and all materials in readiness" in London, where Ged agreed to be by that time. On his arrival, however, he found, that Fenner had neither house nor materials provided, being, as it afterwards appeared, incapable of fulfilling his part of the agreement; but he induced Ged to believe, that the delay was occasioned by his having "got acquainted with a type-founder, who would, for one 16th share from each," furnish all the types that should be wanted. With this letter-founder, whose name was Thomas James, another contract was accordingly entered into; soon after which he furnished them with "two parcels of different types." These types appear to have been of a very imperfect and inferior quality, for Ged complains of them as being altogether unfit for their purpose;* and adds, that they were afterwards informed, that their partner James "had been formerly employed by the King's Printers, but was rejected by them, because one Caslon had eclipsed him in his business."

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* This account is entitled, *Biographical Memoirs of William Ged, including a particular Account of his Progress in the Art of Block-Printing. London, Printed by and for J. Nichols*, 1781. The first part of this pamphlet, as the Editor informs us, was printed from a MS. dictated by Ged sometime before his death; the second part was written by his daughter, for whose benefit the profits of the publication were designed; the third was a copy of proposals, that had been published by Mr. Ged's son in 1751, for reviving his father's art; and to the whole was added Mr. More's narrative of block-printing. From this publication the account here given of Ged's proceedings has been principally compiled. A second edition of this work was a short time ago published, in size and manner uniform with this Essay.

This new contract had existed but a short time, when it was proposed to divide the business into four shares, and to admit Mr. John James,† the brother of Thomas James, an architect of some eminence, and a person possessed of considerable property, as fourth partner. It was also promised Ged, that £100. should be paid him annually for the use of his family, and thirty shillings weekly for his own subsistence. These terms being agreed to, a fresh contract to this effect was put into the hands of a lawyer to be properly drawn out. Soon after this, application was made to the University of Cambridge, for a lease, of their privilege of printing bibles and prayer-books; and after considerable delay, the lease was obtained on the 23d of April, 1731.* As the University could only make the grant to one individual, the lease was made out in

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* With these types, however, Ged represents himself to have wrought for eighteen months, in preparing plates for "several books;" but he does not mention their names, though from an incidental notice in a preceding page (page 7, 2d edit. p. 8), we are enabled to conclude, that amongst them was an octavo prayer-book, of which, he states, plates for five or six sheets were finished. But whether this prayer-book, or any other book, was at this time completed, it is not possible to ascertain, as his narrative does not furnish us with any information on this point; though there is some reason to suppose, as he says the types "proved naught," that the plates made from them were not fit for use.

† Mr. John James was considerably employed in the works at Greenwich, where he settled. He built the church there, and the house of Sir Gregory Page, at Blackheath. James likewise built the church of St. George, Hanover-square, the body of the church at Twickenham, and that of St. Luke, Middlesex,

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which has a slanted obelisk for its steeple. He translated from the French some books on Gardening. See Walpole's *Anecdotes of Painting*, vol. iv. page 48.—*Ged's Memoirs, page* 34, *note* *. 2*d Edit. page* 41.

* For this date we are indebted to the Rev. Dr. Richardson, master of Emanuel College, Cambridge, as stated by him in a letter inserted at page 37, of *Ged's Memoirs*, (2d edit. p. 45).—The terms, upon which this lease was granted, are curious, as exhibiting the little estimation in which this now important privilege was at that time held; the parties were only required to pay to the University the sum of £100. a year, and £5. per annum to one Jonathan Plinder, an old decayed printer of Cambridge! This proceeding of Ged and his partners is represented to have strongly excited the jealousy of the King's Printers in London, who endeavoured to counteract it, by offering higher terms to the University; and after the lease was obtained, by

the name of Fenner, with the understanding, that he would, on the first opportunity, transfer equal shares in this right to the rest of the parties concerned; but this it appears was never done.

As soon as the lease was obtained, Ged seems to have applied himself with eagerness to the manufacturing of plates; but his narrative soon after breaks out into complaints against the "malice" and ill will of his partners, whom he represents as taking every opportunity to thwart him in his operations. He accuses Thomas James of wilfully furnishing him with types, which had never been *adjusted*, in order to destroy the beauty of his plates; and his partners generally of engaging ignorant and unskilful persons to superintend the establishment. He also accuses them of bad faith, in never formally executing the contract, or paying him the sums of money, which had been stipulated, but putting him off, from time to time, with empty promises, in the design of expelling him from the partnership, when they had obtained such a knowledge of his secret, as to render his assistance no longer necessary to them. But he brings the more serious charge against

getting an injunction of the Court of Chancery, restraining them from printing bibles, &c. but this was speedily removed. They are also stated to have suborned the workmen to thwart their proceedings as much as possible.

Fenner, of a design to defraud Mr. John James of a great part of the money he had advanced, and of afterwards entering into a negociation with a Mr. Mount and a Mr. Page, to join them with him, to the exclusion of his former partners, in the University's lease, which still ran in his name. Dissatisfied with his treatment, Ged left Cambridge and returned to London, having first taken the precaution of removing the most important of his "tools, at least so many of them as should disappoint him or any other in the discovery of any part of the invention."—This it appears was a very necessary precaution, for no sooner had Ged departed, than Fenner and his brother broke open the door of his workshop, but were of course disappointed in their expectations. Fenner then applied to different tradesmen to replace what was wanting; but in this he was unsuccessful, for "he could not describe, nor they conceive what he meant."

Soon after this, Mr. John James, having been informed by his brother Thomas, who was intimately acquainted with Mr. Mount and Mr. Page, that Fenner had been bargaining with them for the privilege of the University, was so disgusted with Fenner's conduct, that he told him, "he was a knave and a rogue, who had all along picked his pocket, but that he would strip him to the shirt for his money."

After this rupture, Ged gave up all hopes of "getting matters accommodated," and went to Cambridge, to "look after his household furniture and the remainder of his tools," but Fenner detained "both furniture and tools," for the part of the tools, which Ged had before taken away. Ged regarded this proceeding of Fenner as perfectly unjustifiable, for at that time his partners were indebted to him in the sum of £250. by their engagements to him, as well as his "share of the plates and profits arising from them." And to make it appear probable, that there was an arrear of profits due to him, he states, that, before he left Cambridge, he had been told by a countryman of his "who wrought in the house, that they had printed off 20,000 copies of a small prayer-book of one line, 10,000 of another prayer-book of two columns, from my plates made from the same type; and 10,000 more of an octavo prayer-book of a larger letter, the one half whereof from plates and the other from types; besides 10,000 bibles in manner of this last-mentioned prayer-book." On his return to London, he proposed to Fenner to submit their "difference to the decision of two gentlemen," but this Fenner declined. Mr. James and

Ged then took advice of counsel, and were advised to "join in prosecuting Fenner," which Mr. James at first consented to do, but he delayed so long to carry this resolution into effect, that at length, worn out with continued disappointment, Ged left London, and returned, in 1733, without redress, to Edinburgh.

With the termination of this unfortunate connexion, Ged's own narrative closes. It is certainly a singular relation; but though it may be difficult to agree with him in thinking, that the unsuccessful issue of the project was entirely owing to the malice and perverse proceedings of his partners, for it is not likely, that they could seriously wish to render abortive a scheme, in which so much property was embarked, and which was expected to prove of great advantage to them, yet it is impossible to peruse his narrative without feeling convinced, that Ged was treated with very bad faith by his partners, whose object really appears to have been to amuse him with empty promises, till they had acquired such a knowledge of his processes, as to render his personal assistance no longer necessary to them.— How much of this ill success was owing to the imperfect nature of Ged's invention, or to the improper manner in which it was applied, and the business conducted, it is now impossible to ascertain. That much of it was owing to the circumstance of ignorant and unskilful persons having been engaged to conduct the business, there is every reason to believe; but when we reflect, that not one of the principals was personally conversant with the printing business, and that they had other concerns to occupy their attention, we shall find it easy to account for this, without attributing malice or design to any of the parties. That the new project should excite the jealousy of those, who were established in the regular printing business, is not at all surprising; and in addition to the attempts, that the master printers made to check it, we find, that its progress was most materially impeded by the malicious conduct of the journeymen, who feared, that, if it should succeed, they might be thrown out of employment. It is stated by Mr. Mores, in his *Dissertation upon English Typographical Founders and Founderies*, (page 60), that he "had been told by a straggling workman, who had wrought there, that both bibles and common prayer-books had been printed, but that the compositors, when they corrected one fault, (which was only to be done by perforation,) made purposely half a dozen more, and the pressmen, when the masters were absent, battered the letter in aid of the compositors; in consequence of which base proceedings the books were suppressed by authority, and condemned to *et piper et quicquid, &c.* and that all the chandleries in Cambridge were full of James's bibles, and that the plates were sent to the King's printing-house, and from thence to Mr. Caslon's founding-house, to be melted; an inspector standing at the furnace to see the order fully executed." It is for the reader to determine, whether the authority, upon which this information is given, be of sufficient validity to allow of its being received. We know, however, for certain, that this concern was continued a very short time after Ged quitted it. Dr. Richardson states, in a letter to Mr. Mores, that, after fruitless attempts for three or four years, the business was given up. In or before the year 1735, Fenner died insolvent; and on the 23d of September in the same year, his widow* applied to

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* Mrs. Fenner afterwards married a Mr. Waugh, an apothecary, but carried on the printing business till her death. It seems probable, that her first husband had succeeded in the art of making stereotype plates, notwithstanding the precautions of Ged, for Mr. Nichols informs us, in a note to *Ged's Memoirs*, that at the sale of her effects in 1768, he "purchased a quantity of waste metal, which had been many years accumulating; among this parcel was a great variety of *metal blocks*." One of them, a hand bill for Dr. Stoughton's Elixir, "he had still in his possession" in 1781.—*Ged's Memoirs, page* 38.—*2d Edition, page* 46.

As another instance that stereotype plates were more early and the University for a fresh lease to print bibles, &c. in the common way, but this was refused. The Doctor adds, that, when in office in 1738, finding a considerable arrear of rent due, by using some threatening expressions, he "recovered £50. took up the old lease, and so had done with them."*

We are told by Ged, that during the time they held the lease from the University, two prayer-books were completely, and a prayer-book and a bible were partly, finished with stereotype plates. It ought, however to be noticed, that Dr. Richardson states, that he could not discover, "that they completed one book by block;" but as Ged three times positively asserts, that two prayer-books were finished, I can see no good reason to entertain doubts of the fact. Not a single copy of any book printed by them, has, so far as I know, ever been met with—

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generally used, than is commonly apprehended, it is not unworthy of notice, that amongst a quantity of old type-metal, purchased by a friend of mine about twelve years ago, was a small plate of a shop bill of an apothecary, who had formerly resided in Great Russel-street, London. In one corner of it was a cross, which had evidently been formed from a block of wood; the plate was about the thickness of those cast by the present processes, and about four inches long by two broad.

* *Ged's Memoirs*, page 38.—2d edit. page 46. More's *Dissertation*, page 61.

a circumstance which apparently confirms the information respecting the melancholy termination of this establishment.

After Ged's return to Edinburgh, his friends became anxious that a specimen of his performance should be given to the world, and entered into a subscription for this purpose: but in this design, they met with an unexpected opposition, for such was the spirit of hostility manifested by the trade to Ged's invention, that not a compositor could be found, who would work upon any book intended to be submitted to his process. To obviate this difficulty, Ged's son James was bound apprentice to a printer; and after he had been a little more than a twelvemonth at the business, he was allowed by his master to return to the office in the night time, when all the other compositors were gone, and to set up the pages for his father to cast plates from. In this manner, were prepared the plates for an edition of *Sallust*, which, both his son and daughter assure us, was printed in 1736, though I have never heard of an edition of an earlier date than 1739, whilst the generality of copies bear date in 1744. After this edition of *Sallust*, Ged prepared plates for an edition of Scougall's *Life of God in the Soul of Man;* and for a joint edition of *The Life of God in the Soul of Man*, and *An Account of the Beginnings and*

Advances of a Spiritual Life. Both the latter books, owing probably to the continued hostility of the trade at Edinburgh, were printed at Newcastle, in 1742. In the same year, under the patronage of Dr. Robert Smith and the Bishop of St. Asaph, Ged made application to the University of Cambridge for another lease of their privilege, but without success. When the rebellion broke out in 1745, James Ged, "wearied with many disappointments," joined the forces of the Pretender. He was taken prisoner at Carlisle, and condemned; but, through Dr. Smith's interest with the Duke of Newcastle, was pardoned. After his son obtained his liberty, Ged was induced to enter into another contract with some "gentlemen" to go again to London, as his son was now supposed to have a sufficient knowledge of the business. In consequence of this contract, he had all his implements "new fit up, and sent for Leith to be shipped off," and was on the point of following them himself, when he fell sick and died, October 19, 1749, thus ending "a laborious and innocent life."*

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* As a proof of the disinterested love he bore his country, his daughter tells us, that he would not listen to some offers that were made him from Holland, to prevail upon him, either to go over to that country, or to sell them his invention, because he would not injure his country by doing any thing to enable the

After the death of his father, James Ged had all his implements sent up to him in London, where he had been working some time as a journeyman printer; but as his father died in such very "indifferent circumstances" as put it out of his power to prosecute the discovery without assistance, he, in 1751, issued a prospectus, in which, after extolling his father's invention, and enumerating many of its supposed advantages, he proposed that "the lovers of learning and encouragers of ingenuity, will have the goodness to open a subscription to enable him to prosecute his father's art." The money raised, he proposed, should be deposited in the hands of some person, to be chosen by the subscribers, and not expended without his knowledge and approbation, and he also proposed to "to give all the security in his power, that the gentlemen subscribers shall be gradually re-imbursed out of the profits of his work, in such proportions as they shall think proper." This appeal appears to have been unsuccessful. Having

Dutch to "undersell" his countrymen in the market. This statement of his daughter has been doubted, from the mistaken idea that the Dutch were already in possession of the art of making stereotype plates, through the invention of Van der Mey; but from the account which has already been given of his process, it is evident that that was not the case, and it may, therefore, not be improbable that such an offer was made to Ged.

soon after this received a remittance from his younger brother William, (who, it appears, was also bred up to the printing business, but "being tired with repeated disappointments in his father's invention," had left this country, and gone to Jamaica, "where he did well,") with instructions to buy a fount of types, and to bring his father's implements over with him to Jamaica, James left this country, and proceeded to join his brother. "Unluckily," says their sister, "Mr. James left the tools to be shipped by a friend of his, who most ungenerously kept them to make trial of his skill in that way, and the tools were never heard of more, which was no small disappointment to William, and what he regretted to his last hour, 1767. His brother James died the year after he left London."

Having thus given an account of the proceedings and misfortunes of Ged and his descendants, in their endeavours to carry his invention into practical effect, it only remains to describe the specimens of his art, which he has left behind him. This I am enabled to do by the kindness of my friend, John Trotter Brockett, Esq. from a copy of each of these works, in his possession.

The *Sallust* is printed in 18mo. with that sized letter, which printers call brevier. It consists of 150 pages, exclusive of the title, of which the following is a copy:—" *C. Crispi Sallustii Belli Catilinarii et Jugurthini Historiæ. Edinburgi, Gulielmus Ged, Aurifaber Edinensis, non Typis mobilibus, ut vulgo fieri solet, sed Tabellis seu Laminis fusis, excudebat,* 1744." It has no preface nor any sort of introduction. The number of lines in each page is 35, besides the running head-line and the catch-line at the foot of the page. There is nothing remarkable in its execution, though the paper is of a good quality; it is printed much in the usual style that books in general were at that period. The book bears strong internal evidence of having been got up under the untoward circumstances which have already been noticed; for it clearly appears from the impressions from the plates, that the types, from which they were formed, must have been in a very bad state, and by no means such as a person would have willingly chosen, when about to usher a specimen of his performance into the world. A cursory glance also over its pages serves to convince us, that the proofs could not have been read by any one, either well acquainted with the Latin language, or of much experience as a printer; for throughout the work, we find the divisions of words, at the end of the lines, most arbitrary and unworkmanlike: *omnia*, for instance, is divided *o-mnia; etiam*, *et-iam; ignorari*, *i-gnorari*, *&c.* The copy, I have now before me, like all those I have hitherto seen, bears the date of 1744; but M. Camus, in his *Histoire de la Stéréotypie*, notices a copy in the possession of M. Pierres, printer, of Versailles, with the date of 1739, whilst Ged's son positively states, that an edition of it was printed in 1736. From the appearance of the edition of 1744, it is, I think, probable, that more early editions may have been printed, for the plates have been injured in many places, by the bruising of the folios, and the breaking off of letters; and in page 93, an injury, in the word "*propulsarent*," has been repaired by the insertion of letters of a different cut and larger face than those, which were used in the original composition of the pages; from which circumstance it is probable, that this injury was repaired at a time long subsequent to the casting of the plates, and when no more types of the same fount could be procured.

Both the other books are printed on a pot 12mo.; the paper is very common, and the execution indifferent. The title of the *Life of God, &c.* is as follows:—"*The Life of God in the Soul of Man: or the Nature and Excellency of the Christian Religion. By Henry Scougal, M. A. sometime Professor of Divinity in the University of Aberdeen. With a Preface by Wm. Wishart, D. D. Principal of the College of Edinburgh. Newcastle: Printed by J.*

White, from Plates made by W. Ged, Goldsmith, in Edinburgh, 1742." The letter is of the size called long primer, with *cut-in* notes of minion or brevier Italic. The body of the work forms 108 pages, and the title, preface, and table of contents, occupy 12 pages more. Each page contains 31 lines, exclusive of the running head-line and the catch-word at the foot of the page.

The following is a copy of the title of the joint edition of the above book and the *Account of a Spiritual Life*:—"*The Life of God in the Soul of Man: or the Nature and Excellency of the Christian Religion: with the Methods of attaining the Happiness which it proposes. To which is added, an Account of the Beginnings and Advances of a Spiritual Life, with a Preface by G. Burnet. Newcastle: Printed and sold by John White. From Plates made by William Ged, Goldsmith, in Edinburgh*, 1742." The titles, preface, and contents, occupy 18 pages; these are printed on brevier, and are remarkable on account of being without folios.—The body of the work is printed on a small faced minion, with *cut-in* notes of the same, in Italics.—*The Life of God, &c.* occupies 63 pages, of 41 lines each, exclusive of the running head-line and the catch-line. This is followed by the *Account of a Spiritual Life*, which has distinct titles (with imprint), folios, and signatures; evidently for the purpose of allowing it to be published separately from the other work. The type and page are exactly the same as has just been noticed. The number of pages is 33, besides the two titles; there is no preface. This book from the smallness of the type, affords a very favourable specimen of Ged's proficiency in the art of making stereotype plates.

By the kindness of Alexander Tilloch, Esq. whose successful effort in the art of stereotype printing I shall shortly have occasion to notice, I am enabled to present the reader with an impression taken from a plate of Ged's edition of *Sallust*, now in that gentleman's possession. It has unfortunately received considerable injury, but is yet sufficiently perfect to convey some idea of the size and style of the work; an impression from it, when in a much more perfect state, will be found in the tenth volume of the *Philosophical Magazine*, page 272. It is the plate of page 13, but the folio and catch-word have been broken off. The plate itself is about a quarter of an inch thick, and is a little larger than the page of types, the edges having apparently been planed down to within a very short distance of the letters. It has been fastened to the block of wood, on which it was raised when in use, by small nails or screws, passed through the blank lines at the head and foot,

Specimen of W. Ged's *Stereotype.*

CATILINA. Cap. XIX.

ia legibus ambitus interrogati pœnas dederant. Poſt paullo Catilina, pecuniarum repetundarum reus, prohibitus erat conſulatum petere; quod intra legitimos dies profiteri nequiverit. Erat eodem tempore Cn. Piſo, adoleſcens nobilis, ſummæ audaciæ, egens, factioſus, quem ad perturbandam rempublicam inopia atque mali mores ſtimulabant. Cum hoc Catilina & Autronius, conſilio communicato, parabant in Capitolio Kalendis Januariis L. Cottam & L. Torquatum Conſules interficere; ipſi, faſcibus correptis, Piſonem cum exercitu ad obtinendas duas Hiſpanias mittere. Ea re cognita rurſus, in Nonas Februarias conſilium cædis tranſtulerant. Jam tum non Conſulibus modo, ſed pleriſque Senatoribus perniciem machinabantur. Quod ni Catalina maturaſſet pro curia ſignum ſociis dare; eo die, poſt conditam urbem Romanam, peſſumum facinus patratum foret. Quia nondum frequentes armati convenerant; ea res conſilium diremit.

XIX. Poſtea Piſo in citeriorem Hiſpaniam Quæſtor pro Prætore miſſus eſt, adnitente Craſſo; quod eum infeſtum inimicum Cn. Pompeio cognoverat. Neque tamen ſenatus provinciam invitus dederat: quippe fœdum hominem a republica procul eſſe volebat: ſimul, quia boni quam plures præſidium in eo putabant: & jam tum potentia Cn. Pompeii formidoloſa erat. Sed is Piſo, in provinciam ab equitibus Hiſpanis, quos in exercitu ductabat, iter faciens, occiſus eſt. Sunt, qui ita dicunt, imperia ejus injuſta, ſuperba, crudelia, barbaros nequiviſſe pati: alii autem, equites illos, Cn. Pompeii veteres fidoſque clientes, voluntate ejus Piſonem

and also through the opening in the centre. The back of it is quite level, but whether rendered so in the casting, or by mechanical means afterwards, I am unable to conjecture.

Of the process, pursued by Ged in the manufacturing of his plates, we are entirely ignorant, for the vague manner, in which both he and his descendants speak of his "tools" and his "implements," conveys to us no idea of its nature. Mr. Mores, indeed, tells us, that his plates were cast in a mould taken from the pages, by suffusing them with "some sort of gypsum," but he does not give any authority for this assertion. If such were his process, he must have pursued a different and more expeditious method, than that practised at the present day, for his son states, that he was "able to make plates for one half sheet, in less than two hours." But judging from the appearance of the plate, I should conclude, that the mould has not been taken from the page by suffusing it with gypsum (plaster); for the letters do not rise more than the neck of the type above, what may be called, the field of the plate, which is quite flat, and does not exhibit any marks of the shoulders of the types, the scabbards between the lines, or the tops of the spaces or quadrats,—as it would have done, had the mould been taken with gypsum, which, it is well known, insinuates itself into every opening, receives the impression of every thing it touches, and leaves corresponding openings and marks in whatever is cast in a mould formed of it. From the absence of all such marks, and the flatness of the field, I am of opinion, that the face of the page must have been slightly pressed into the substance destined to form the mould, so as just to leave an impression of the face and neck of the types. The plate affords further evidence of such a process, from the letters, on the extreme edges of it, standing up rather higher than the others,—owing to the page having made a deeper impression in those parts, as almost inevitably happens, when such a plan is pursued; some of the letters also in these situations exhibit some appearance of the shoulder of the type, but there is not the least mark of any space or quadrat.

A considerable interval now occurs unmarked, as far as I can learn, with any attempt in the line of art, which is the object of my present inquiry; but some processes nearly connected with it, described in books published during this interval in Germany, are not undeserving of notice.—In the year 1740, a small volume was published at Erfurth, the title of which may be thus translated:—“A short but useful introduction to the engraving of plates (or blocks) of wood and steel, for the making of letters, ornaments, and other figures, * * * * and to the art of baking plaster, of preparing sand moulds for casting letters, vignettes, tail-pieces, medals, and of forming matrices from them."* The processes, for preparing moulds of plaster and sand, are detailed in the three first chapters of the third part, from page 81 to page 96.

The forming of moulds of plaster is thus described in the first chapter. Having placed the engraving, or piece, of which we wish to have the copy, upon a suitable place, let it be surrounded with small slips of wood, and little walls, or borders, of clay raised round the whole. If it be an engraving on wood, it ought to be covered with a light coat of oil. There must then be poured upon it as much as is thought sufficient of a composition, consisting of two and a half parts of baked and finely sifted plaster of Paris, one part of well dried brick-dust, reduced to an impalpable powder, and half a part of finely pulverised amianthus; the whole mixed together in water, and well stirred, in order that there may be no lumps. The composition ought to be poured gradually upon it, and spread over the piece with the finger, or what is better, with a brush, so that no vacancy or air hole may remain. When the composition has become hard, the walls of clay must be removed, and the mass carefully detached from the wooden block; we thus obtain a mould fit to receive the melted metal.

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* *Kurze doch nutzliche Anleitung von Form und Stahl-schneiden. Erfurt, verlegt von Joh. Mich. Funckter, Buchhandler und univers Buchdrucker*, 1740. There is another edition of this book in 8vo. bearing the date of 1754. It is to this latter edition that the references in the text are made.

The second chapter treats of the formation of moulds of sand. The author proposes the use of such sand, as that which is employed by pewterers, and that which is found in the bottom of the tracks of wheel carriages. These he mixes with clipped wool, or bits *(étoupes)* of cotton. He also uses as ingredients, chalk, and ashes or cinders, from which a ley has been drawn. These materials he usually binds together with strong beer. When the mixture is prepared, the piece, from which a mould is to be taken, must be sprinkled with finely pounded charcoal, and covered with a frame or vessel, in the shape of a bottle without a bottom, into which the composition is to be poured, and firmly pressed down. When the mass is subsequently detached from the piece and the frame, it will present a mould, into which fused metal may be poured.

The process detailed in the third chapter is different from either of the above methods, and is thus described. Dilute some blood with water, and with a brush lay a slight coat of it upon the wood engraving, from which you wish to form the matrice; the effect of this application is to preserve the wood from being injured by the heat to which it is afterwards exposed. Make a box or tray of paper, a very little larger than the cut, and rub it also over with the diluted blood. Pour into this tray a little melted lead, then take the cut in both hands, and sink the face of it very evenly into the lead, which ought to be neither too hot nor too cold. The cut must then be detached from the lead, the rough edges cut away, and the bottom of the matrice, which has thus been formed, rubbed upon a stone to dress it exactly. The matrice must then be fixed in a mandrill, to the back of which a handle is attached by means of a screw, and raised by the handle perpendicularly over a small paper tray rubbed over with blood, as before mentioned, and filled with melted type-metal. When the metal has attained the proper degree of heat, plunge the matrice smartly and as evenly as possible into it, and there allow it to remain till the metal cools; there will thus be formed a plate, which, with the blade of a knife, may be easily detached from the matrice. The hand ought to be furnished with a glove, to prevent it being burnt by the metal when struck; and in order to preserve the matrice, it may either be rubbed over with water, in which blood has been mixed, or with diluted nitric acid *(eau seconde)*, or be exposed to the smoke of resinous wood.*

This process bears a strong resemblance to that which the sinkers of dies for coins and medals have been long in the habit of following, when they wish to obtain a proof of their work. For this purpose they pour some melted lead upon a piece of paper, or upon a table, and when it is on the point of cooling, they strike the die quickly and strongly upon it, in order to make the metal enter the minutest lines and cavities. They thus obtain an impression of the die in relief.

Processes, similar to those detailed in the book printed at Erfurth, are described in the German Encyclopædia, or Universal Dictionary of the Sciences and Arts, published at Frankfort on the Maine, in 4to. In the first volume printed in 1778, under the word *abklatschen*, we read as follows:—

"Wood-cuts, such as those which are engraved for vignettes, being very expensive, fac-similes in metal may be taken from them, much cheaper, but also less correct and beautiful. To obtain these we must pour some melted lead into a paste-board tray, and plunge the face of the wood engraving into the lead; which, when cold, supplies us with a matrice. This matrice must then be smoked with resinous wood, or be rubbed lightly over with very fine chalk, in order to prevent the two metals, in the subsequent operation, from adhering together. Some melted type-metal must then be poured into another paste-board tray, and the leaden matrice pressed into it with a blow, the force of which causes the metal to penetrate all the lines of the matrice. By this means we obtain a stamp nearly similar to the wood engraving; if necessary, it may be touched with the graver. It is then fixed upon a little square block." It is stated at the end of this article, that if it be wished to take a mould from a piece of larger dimensions, the process, described under the word *buchdruckerstock*, must be followed. This article is contained in the fourth volume published in 1780.

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* Camus, *Hist. de la Stér.* page 22—27.

"For pieces of a certain size," it is said in this article, "we must bake some *spar*,* pound it very fine, wet it with a solution of sal-ammoniac, and press it into a frame. The engraved piece is then laid upon the mass of spar, and forcibly pressed into it; after this the engraving is removed, and the spar left to dry. When it is dry, the fused metal is poured into it, and it is shaken gently in order that the metal may penetrate into all the lines.—The print or stamp, which the metal exhibits, when it has cooled, only requires to be slightly touched with the graver."*

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* The spar here mentioned is either the calcareous spar, or the common heavy spar of the *Sciagraphia* of Bergmann; the former of these is now called carbonate of lime, and the latter sulphate of barytes.—*Camus.*

These, or similar processes, for taking copies in metal from wood engravings, appear to have been in use in Germany about the time of which I am now speaking, but I cannot learn that it was ever attempted to extend them to the making of plates from pages composed of types.

In the year 1775, an attempt at stereotype printing was made at Philadelphia, by Benjamin Mecom, nephew of the illustrious Dr. Franklin. He cast plates, it is said, for several pages of the New Testament, and made considerable progress towards its completion; but he never effected it.†

I have now approached an era remarkable, in the typographical annals of Britain, for a second discovery and successful practice of the art of making stereotype plates. It appears from a statement published 20 years ago, by Alexander Tilloch, Esq. so well known to the scientific world as the intelligent Editor of the *Philosophical Magazine*, that some time prior to the year 1780, without any knowledge of Ged's previous invention, the practicability of "founding" whole pages suggested itself to his mind. Such a plan, he thought, would be an improvement in the art of printing, and productive of "many advantages in point of economy." But as the account of his invention and proceedings is not long, I prefer giving it in his own words. After mentioning some of the expected advantages, he says,—

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* Camus, *Hist. de la Stér.* pages 28—31.

† Thomas's *History of Printing in America*, vol. i. p. 215, vol. ii. page 68.

"I communicated my ideas upon this subject to Mr. Foulis, printer to the University of Glasgow, my native city, and where I then resided, who furnished me with a page of types ready set up, or composed, for my first experiment,* which had sufficient success to induce me to try others, and convinced Mr. Foulis of the possibility of producing plates, which would yield impressions not to be distinguished from those taken from types.

"If I had seen some of the advantages which such a plan promised, Mr Foulis saw and pointed out many more, of such a nature as could only present themselves to a regular bred practical printer.—

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* The first experiment was made in 1779.

We agreed to prosecute the business together, and, if possible, to bring it to perfection, and in pursuance of this resolution performed, I may say, innumerable experiments, till we at last overcame every difficulty, and were able to produce plates, the impressions from which could not be distinguished from those taken from the types, from which they were cast.

" In the mean time we learnt that our art, or one extremely similar, had been practised many years before by Mr. Ged, and soon after the world was favoured by Mr. Nichols with an interesting pamphlet, entitled " *Biographical Memoirs of William Ged, including a particular account of his progress in the art of Block-Printing*." Here Mr. Tilloch enters into a short account of Ged's proceedings, and then resumes his own narrative. " Though we had reason to fear, from what we found Ged had met with, that our efforts would experience a similar opposition from prejudice and ignorance, we persevered in our object for a considerable time, and at last resolved to take out patents for England, Scotland, and Ireland, to secure to ourselves, for the usual term, the benefits of our invention; for the discovery was still as much our own, as if nothing similar had been practised before; Ged's knowledge of the art having died with his son. The patents were accordingly obtained. As to *benefits*, however, I have as yet reaped none, and Mr. Foulis, I believe, has reaped as few, for owing to circumstances of a private nature, and which no way concern the public to know, the business was laid aside for a time, and having afterwards quitted Glasgow, and removed to London, I soon found myself so much occupied with other concerns, that I have hardly had time to think upon it since. I ought, however, to observe here, that its being suspended was not on account of any imperfection attending the art, or objections against its being a fit subject to be prosecuted. On the contrary, several small volumes were printed from plates made by myself and Mr. Foulis, and the editions were sold to the trade without any intimation of their being printed out of the common way! We had heard whispers that our work could not possibly be such as would pass for *common printing!* The trade knew what we were at, and would *take care* of any thing done in the *new-fangled way*. The first essays, therefore, were in the lowest sense of the word common: one or two *histories*,* and a cheap edition of *The Economy*

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* "A kind of books technically so called, such as *The Seven* Champions of Christendom; The Twelve Cæsars; The History of Valentine and Orson; The French Convert; and such scientific

of Human Life. We also printed a Greek volume, *Xenophon's Annabasis*, 1783, and had plates for several small volumes of the English Poets almost finished, but the latter were never put to press."*

Mr. Tilloch, in this statement, does not enter into any "detail of particulars respecting the processes" pursued by him, but having in the most liberal and polite manner replied to my enquiries on the subject, I am enabled to state, that the principal feature of the process consisted in taking a mould from the pages by means of plaster of Paris. Trial was made of several other substances, but the preference was given to this. He never, he says, found any difficulty in making the melted metal enter completely into all the lines of the moulds, provided they were thoroughly dry and hot. The greatest difficulties he had to encounter were to render the plates level at the back, and raise them to their proper height. To accomplish these objects he fastened the backs of the plates with cement to blocks of wood; then laying the plate on its face, and fastening it and the block down, with a long plane, supported at both ends by bearers, which

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and classical performances, of which great numbers are (were) annually exported to America."

* *Philosophical Magazine*, vol. x. pages 272—275.

prevented the plane from cutting beyond a certain depth, he reduced the block to the proper height. This method, however, being found extremely slow and inconvenient, and causing the plates to occupy more room, when out of use, than was desirable, was soon abandoned, and the following expedient tried. The plate was supported upon a brass block, hollow on its under side, and pierced with several cross slits, of sufficient width, compared with the lines of the plate, to allow a little deviation, so as to permit small screw nails, passed through perforations made between the lines, wherever room could be best found for them, to be put through these slits, and fastened by nuts on the under side. The plate was applied to the block as follows:—a piece of paper was put over the block to prevent adhesion, the paper was covered with a stiff cement of rosin, &c. and the plate put in its place on the block.—The block having been previously warmed sufficiently to soften the cement, the whole was placed between two level surfaces, and a weight put upon the upper one; and when the upper surface was brought by the weight to touch two bearers of the exact height of a type, the block, plate, &c. were put into cold water to prevent any more of the cement from being pressed out. The plate was then perforated, and fastened to the block by the screws and nuts already mentioned. It being impossible that Mr. Tilloch could remain satisfied with this method, which, though an improvement on the first, was still found too slow and troublesome; he made trial of several other methods, and at length by making improvements in his apparatus, he succeeded in casting the plates of one uniform thickness.—Having succeeded in this most important point, he raised them to the proper height by means of such brass blocks as are now in use, and which will be explained hereafter.

Having been obligingly favoured by Mr. Tilloch with the loan of several of his plates, I am enabled to present the reader with specimens of both his Greek and Roman stereotype. The plates have unavoidably been exposed to much ill usage during a course of 40 years; but notwithstanding, their present state is such, as to render all apology for them unnecessary, and to afford convincing evidence of the truth of Mr. Tilloch's assertion, that, when first made, they yielded impressions "which could not be distinguished from those taken from the types, from which they were cast." Each of these plates are raised upon wooden blocks, according to the method first pursued by Mr. Tilloch, and are consequently some of the earliest of his productions. They are each of the exact size of the page of letters, but are of different degrees of thickness; the Greek plate being about a tenth, and the Roman plate about an eighth, of an inch thick, reckoning from the face of the letter to the back of the plate. The field, or flat body, of the Greek plate is not thicker than strong card-paper; that of another plate, raised upon a brass block as noticed above, is even thinner, the whole plate not being more than one twelfth of an inch thick. From this description, it will be evident to such of my readers as are conversant with the practice of casting stereotype plates, that the types must have been prepared for the purpose, in the same manner as at present;—the shoulders of the types* have not been dressed off, and the spaces and quadrats, together with the leads put between the lines, have been cast of the exact height of the shoulder, and rendered square on the top, thus making the page, when composed, present a smooth and solid body immediately below the neck of the type. To Mr. Tilloch, therefore, the art of stereotype is indebted for the introduction of the high spaces and quadrats, which have been subsequently adopted by Earl Stanhope, to whom both Mr. Tilloch and Mr. Foulis communicated every particular respecting their process. And, as there can be no doubt, that the information his Lordship thus obtained, formed the ground work of the process afterwards recommended by him, as will indeed be sufficiently evident from the above account, Mr. Tilloch is justly entitled to be considered as the founder of the system of stereotype, now generally practised in England.

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* The shoulders of a type are the square corners of the shank, or body, immediately below the neck; they are usually dressed off at an angle. The spaces are the short pieces of metal placed between words; and the quadrats are larger pieces used for filling up the blank parts of lines, &c.

That portion of the last century, of which I am now treating, is also remarkable for the first known attempt at polytyping. This was one of the many projects, which emanated from the fertile invention of the celebrated Dr. Franklin; and is mentioned by M. Rochon, member of the French Academy of Sciences and Arts, and afterwards Director of the Marine Observatory at Brest, in a *Memoire* upon a machine for engraving which he had invented. Before describing this machine, he states, that Franklin had excited his curiosity by shewing him some attempts, which he had made in America, to print as fast as one could write. "The means, which Franklin appears to have employed," says he, "consist in writing upon paper with a glutinous ink. He then powders his writing with emery or

Specimen of Messrs. TILLOCH AND FOULIS'S *Roman Stereotype.*

4 HOMER'S ILIAD. XIII. 57.

Infrangible, immortal : there they ſtay.
The father of the floods purſues his way ;
Where, like a tempeſt dark'ning heav'n around,
Or fiery deluge that devours the ground,
Th' impatient Trojans, in a gloomy throng,
Embattel'd roll'd, as Hector ruſh'd along.
To the loud tumult and the barb'rous cry,
The heav'ns re-echo, and the ſhores reply ;
They vow deſtruction to the Grecian name,
And in their hopes, the fleets already flame.
But Neptune, riſing from the ſeas profound,
The god whoſe earthquakes rock the ſolid ground,
Now wears a mortal form ; like Calchas ſeen,
Such his loud voice, and ſuch his manly mien ;
His ſhouts inceſſant ev'ry Greek inſpire,
But moſt th' Ajaces, adding fire to fire.
'Tis yours, O warriors, all our hopes to raiſe ;
Oh recollect your ancient worth and praiſe !
'Tis yours to ſave us, if you ceaſe to fear ;
Flight, more than ſhameful, is deſtructive here.
On other works tho' Troy with fury fall,
And pour her armies o'er our batter'd wall;
There, Greece has ſtrength : but this, this part o'erthrown,
Her ſtrength were vain ; I dread for you alone.
Here Hector rages like the force of fire,
Vaunts of his gods, and calls high Jove his ſire.
If yet ſome heav'nly pow'r your breaſt excite,
Breathe in your hearts, and ſtring your arms to fight,
Greece yet may live, her threaten'd fleet maintain,
And Hector's force, and Jove's own aid, be vain.

Specimen of Messrs. TILLOCH AND FOULIS'S *Greek Stereotype.*

πλάγη τῇ ἐφόδῳ τῇδε, δῆλον ἦν. Τῇ μὲν γὰρ πρόσθεν ἡμέρᾳ πέμπων, τὰ ὅπλα παραδιδόναι ἐκέλευε, τότε δὲ ἅμα ἡλίῳ ἀνατέλλοντι κήρυκας ἔπεμψε περὶ σπονδῶν. Οἱ δ' ἐπεὶ ἦλθον πρὸς τοὺς προφύλακας, ἐζήτουν τοὺς ἄρχοντας. Επεὶ δ' ἀπήγγειλαν οἱ προφύλακες, Κλέαρχος τυχὼν τότε τὰς τάξεις ἐπισκοπῶν, εἶπε τοῖς προφύλαξι, κελεύειν τοὺς κήρυκας περιμένειν, ἄχρις ἂν σχολάσῃ. Επεὶ δὲ κατέστησε τὸ στράτευμα, ὥστε καλῶς ἔχειν ὁρᾶσθαι πάντη φάλαγγα πυκνὴν, τῶν δὲ ἀόπλων μηδένα καταφανῆ εἶναι, ἐκάλεσε τοὺς ἀγγέλους, καὶ αὐτός τε προῆλθε τούς τε εὐοπλοτάτους ἔχων καὶ εὐειδεστάτους τῶν αὐτοῦ στρατιωτῶν, καὶ τοῖς ἄλλοις στρατηγοῖς ταῦτα ἔφρασεν. Επεὶ δὲ πρὸς τοῖς ἀγγέλοις ἦσαν, ἠρώτα τί βούλοιντο. Οἱ δ' ἔλεγον ὅτι περὶ σπονδῶν ἥκοιεν ἄνδρες, οἵτινες ἱκανοὶ ἔσονται τά τε παρὰ βασιλέως τοῖς Ἕλλησιν ἀπαγγεῖλαι, καὶ

the dust of cast iron, pounded and sifted, and afterwards places it between two plates, one of which, namely the one which is to receive the writing, ought to be of soft metal, as tin or copper, the other of a hard stone or iron. On these two plates being passed through a rolling press, an indention of the writing will be made in the plate of soft metal. From this plate a number of copies may be taken by the operations of copper-plate printing."

The copies obtained from a plate of this description having a disagreeable appearance, Rochon, to remedy this, proposed to write with a steel point upon a plate of copper varnished and prepared as for etching, and then to cover the plate with aquafortis, which will, of course, corrode the plate in all the traces made upon it by the point. When the acid and varnish are removed, the writing will be found sufficiently indented in the plate to allow of copies being taken from it; but as these will only present a copy of the writing in reverse, they must, whilst the ink is yet fresh, be each placed upon a blank sheet of damp and prepared paper, and strongly pressed. Neat and legible copies will thus be obtained. Rochon was of opinion, that this method might be found very useful in all cases, where it was desirable to obtain, in a short space of time, a number of copies of any manuscript of no great extent, when a printing-press could not be had recourse to. Interesting memoirs, he says, the printing of which had been prohibited, were printed in this manner. The same process was also used in the publication of flying gazettes.*

At this time the press in France was placed under severe restraint, and in order to secure the full observance of the prohibitory regulations, there were others, which did not permit the acquirement of a press and other printing materials by any person at his pleasure. It hence became a favourite object with the literary characters of that country, to discover a method, by which authors might be enabled to print their works under their own inspection, without subjecting themselves to the operation of these regulations. In furtherance of this object, Rochon, after his first essays, was instigated by the celebrated Turgot and Morellet to endeavour to bring to perfection a project, which he had long entertained, of engraving by means of a machine. With their wishes he complied, and the result of his labours was a machine, by which he was enabled to stamp letters into plates of metal, with great facility, and with more expedition than a compositor can arrange types in his stick. By particular contrivances the pressure, it is said, was so regulated as that all the impressions were made to the same depth, and the spaces between the words could be so varied as to preserve the regular and uniform termination of the lines. Condorcet and Bossut made a favourable report respecting this machine to the Academy of Sciences, and expressed an opinion that it might be useful in armies, fleets, and public offices, for the printing of orders, &c. It seems to have been principally intended for the stamping of plates to be used at the rolling-press, but its inventor also expected that stereotype plates might be cast from the plates engraved by it. I cannot, however, learn that it was ever applied to this purpose.*

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* Camus, *Hist. de la Stér.* pages 33—36; and Nicholson's *Journal of Nat. Phil. &c.* vol. iii. 4to. page 64.

The year 1784 is a memorable era in the history of stereotype and polytype printing, in France, as the attempts, which were made in that year in these arts by François-Ignace-Joseph Hoffmann, a native of Alsace, but residing at that time in France, excited the emulation of the artists of that nation, and produced an uninterrupted series of efforts, which in the course of twenty years brought the art of stereotype printing to that state of perfection in which it is now there practised.—Availing himself of the then recent discoveries of Darcet respecting the easy fusibility of certain alloys of bismuth,* Hoffmann attempted to apply some of these to the formation of stereotype plates, by pressing them into moulds, or matrices, the idea of forming which, from pages of types, he had taken from the previous essays of Ged.

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* A description of this machine was inserted in the *Bibliothèque Physico-économique*, for 1785, and in the fourth volume of the *Journal de Physique*, under the title of *Memoire sur la Typographie*, a translation of which, with a plate of the machine, will be found in Nicholson's *Journal of Nat. Phil. &c.* vol. iii, page 61, 4to. This machine was presented to the Academy of Sciences in 1781.

He thus describes his process in a manuscript memoir, quoted by M. Camus:—"With a page, composed of types in the usual manner, he made an impression in a mass of soft fat earth, mixed with plaster (gypsum), and prepared with a glutinous paste of syrup of gum and potatoe starch. This impression became a matrice, into which a composition of lead, bismuth, and tin, being pressed at the moment of cooling, gave plates, which exhibited, in relief, fac-similes of the types, which had been used to form the matrice." In another part of the same memoir, it appears, that, before pouring the alloy into the clay matrices, he heated in a stove both them and the trowel, with which he spread and pressed the alloy into them, in order to prevent a too rapid and unequal cooling of the metal. Instead of the composition above mentioned, he sometimes used clay, mixed with Spanish white and Champagne chalk. The solid plate, which was the result of this process, when squared and properly adjusted, he fixed with pins upon a square block of walnut-tree wood.

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* Six parts of bismuth, four of tin, and three of lead form an alloy, which becomes very soft at the heat of boiling water, and which may be kneaded like wax, when half fluid. Eight parts of bismuth, five of lead, and three of tin form an alloy, which melts at a heat less than that of boiling water.

By this process Hoffmann printed many sheets of his *Journal Polytype*, and announced as a stereotyped (or in his phrase a polytyped) book, the *Recherches historiques sur les Maures*, by De Chenier, which appeared in 1787, in three volumes, 8vo.—After a careful examination of this book, M. Camus is of opinion, that, with the exception of the tables which are at the end of each volume, the whole of it has been stereotyped.* To his account of it Camus joins a specimen of one of the pages, taken from a plate which had been lent to him; this specimen, though certainly nothing to boast of, is probably not much inferior in appearance to what an impression taken from the types would have been.

But Hoffmann did not confine his efforts to the formation of stereotype plates only; he also attempted, by means of the same alloyed metal, to produce polytype plates, to be used after the manner of copper-plate printing. In the memoir which has already been quoted, he states, that having found this alloy capable of receiving by pressure the most delicate impressions, "he found means to make plates, which bore *en creux*, like an engraving, the writing, or design, which he had made, upon a highly polished plate of copper, with an earthy paint *(couleur terrestre)*, if this plate was pressed upon the alloyed metal at the moment of cooling." Hoffmann acknowledges, that this kind of engraving was attended with difficulties, and it does not appear that he made much use of it.

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* Camus, *Hist. de la Stér.* pages 38—42.

The result of these processes he announced in the year 1784, as appears by the following note, signed by Le Roi, of the Academy of Sciences, on the 13th of March, 1784. "At half past 11 o'clock this morning, the President Sarron, M. Bailly, and myself, having called at Messrs. Hoffmann's house, were presented with a plate of copper, upon which each of us wrote a sentence with a black ink, with which we were provided. We returned this plate, with the sentences written upon it, at six minutes past 12; at 30 minutes past 12, the plate was again returned to us, having in the mean time been used to make another plate capable of printing these sentences, and we effaced the sentences from this first plate; at 45 minutes past 12, there was brought to us a proof of our sentences, which we now submit to the inspection of the Academy." To this note there is attached the proof in question, which it is evident has been taken from a plate indented in the manner of a copper-plate engraving. The writing is distinct and legible; but it resembles in appearance a writing made with thick and muddy ink.

At the end of the year 1784, Hoffmann published a *Prospectus du Journal Polytype des Sciences et des Arts*, in which he announced that if the public should encourage his undertaking, the *Journal* should appear on the first of January, 1785. This Prospectus was published in two sizes; namely, one leaf in small folio, the characters of which resemble those called Roman; and two leaves in 8vo. the characters of which are those of common writing. M. Camus is of opinion, that the capital letters forming the title and first word of the folio size, have been struck with a punch; and that the other letters, as well as the whole of those of the 8vo. have been traced by the hand with an ink, which, when hard, has left an impression in a plate of metal, in the manner noticed above.

In the above year, Hoffmann and his son obtained an exclusive privilege for 15 years of "engraving *en creux* and in relief by the processes of a new art," and in January, 1785, this privilege was extended to their *Journal*. But they soon experienced opposition from the copper-plate printers, and anticipating similar opposition on the part of the other printers, they petitioned the Keeper of the Seals, de Miroménil, to grant them the customary privilege for printing, under the distinguishing title of "*Imprimerie polytype*." In consequence of their petition, a commission was issued on the 17th of August, 1785, to examine their processes, and receive from them a specification of the secret of their art.—The commissioners having executed the trust assigned to them, and made a somewhat favourable report,* an order of council was issued on the 5th of December, 1785, authorising the new method of printing practised by Messrs. Hoffmann. But they enjoyed this privilege a very short time, for on the 25th of September, 1787, seals were placed, by order of the King, on the doors of their establishment; and on the 1st of November, in the same year, the office was suppressed by a second order in council. This proceeding appears to have been caused by the Messrs. Hoffmann having been engaged in printing prohibited writings. Notwithstanding this unfortunate event, Hoffmann did not abandon his endeavours to bring his several processes to perfection; and in 1792, proposed others of a different description,—but before detailing them it is necessary to notice the attempts of others.*

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* There are attached to this document, 1st. a sheet of music, entitled "*Domine salvum, motet à trois voix*," and at the end, "*écrit par Douville et multiplié par le polytype;*" this has been printed from a plate *en creux;* it bears a great resemblance to a piece written with a dirty ink. 2d. Another proof of a page in folio, entitled "*Tableau généalogique et chronologique des Compagnies de Commerce établies en France par Lettres-patentes.*" The writing of this is in general more neat, but it is sometimes also feebly rendered. 3d. A proof of six verses (the first "*Un Maître ivrogne dans la rue*"), taken off upon very strong paper, and upon which there is written with the hand "First attempt in relief." The characters of this proof are those of common writing, and really appear to be printed from a plate bearing them in relief.—*Camus.*

The boasting manner in which Hoffmann announced his discoveries, and the mystery in which he endeavoured to envelope them, raised a general curiosity, and incited many others to attempt to produce similar results. Amongst these attempts, may be noticed, those of Bulliard, author of the *Flore Française*, and of Lhéritier, Member of the National Institute, who succeeded in producing some specimens of polytype, either by the same or very similar processes; and of Pierres, already mentioned, who attempted to cast stereotype plates in moulds of sand. A plate of this description, formed of copper, he submitted to the inspection of M. Camus, who has inserted an impression taken from it in his work, but it cannot be called a successful effort.—All the letters are sufficiently distinct, but the copper has failed to acquire the sharpness and clearness of the original types, every stroke being as strong again as it should be; the effect indeed is such as might be expected from a page, every type of which had been bruised with a hammer.

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* Camus, *Hist. de la Stér.* pages 38—51.

Soon after Hoffmann announced his publications, Pingeron, a skilful mechanic, wrote a letter,* containing observations having reference to both the processes of Hoffmann. For the purpose of stereotyping, he proposed to make a composition, formed of talc, gypsum, clay, Venice tripoli, and founders' sand, capable of receiving a clear impression; to press into this mass the face of a page composed of types, and then to pour melted type-metal into the matrice thus formed. On the subject of the other branch of the art, he thus expressed himself:—" I have for more than thirty years been acquainted with a process, by which writings might be multiplied prodigiously in a very short time, but the abuse, which might be made of it, has induced me to keep it secret. The small bulk of the apparatus, and the silence, with which the work could be carried on, would greatly contribute to elude the vigilance of those who are charged with the preservation of good order." Pingeron's letter was reprinted in the *Traité élémentaire de l'Imprimerie*, or *Manuel de l'Imprimerie*, by Momoro, published in 1793, but which the author assures us was written about 1785. He also gives at page 293, under the word *Polytype-page*, directions for the composition of a sand fit for receiving the impression of types or similar things. The basis of his composition is German spar, well baked and ground with water, in which sal-ammoniac has been dissolved, in the proportion of one pound to two quarts.* This composition, he states, to be capable of bearing many castings without breaking.

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* Published in the *Mercure de France*, on the 25th of March, 1786.

Under the influence of the same motive as actuated him in the invention of his machine, Rochon, at the suggestion of Condorcet, attempted to shew the possibility of forming plates for large works, with a very small quantity of types. The whole of the types he possessed were contained in a box of the form of a book, and were sufficient for the composition of four lines only. “When these four lines were composed,” says Rochon, “I took an impression from them in fine plaster, mixed with charcoal dust. This mould served me to take many copies in metal of the four lines I had composed. The mould should be very dry, and a light pressure on the metal, when beginning to cool, tends greatly to produce a good plate. It requires seven or eight such pieces to form a page. I can assert that this process is neither long nor difficult. It affords a ready means of making corrections and additions.”*

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* Camus, *Hist. de la Stér.* pages 52—55.

Rochon presented a specimen of his performance to the Academy of Sciences on the 8th of February, 1786, and an impression from it is inserted by Camus, in his *Hist. de la Stéréotypie.* This impression has a most miserable appearance, the types, from which the plate was formed, having evidently been very bad ones.

The page was originally composed of five pieces, but one of them has been lost. The pieces are fastened to the block of wood, on which they are raised, by their ends being secured by a small border of wood nailed upon the block. The discovery of this means of multiplying the copies of a book, without going into the workshop of a printer, Camus designates as a triumph over despotism.*

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* *Mémoire sur la Typographie*, inserted in the *Journal de Physique*, brumaire an 7, page 375; *Nicholson's Journal*, vol. iii, page 71, 4to.

But the most successful of those, whose attention was directed to this subject by the publication of Hoffmann's *Journal Polytype*, was Joseph Carez,† a printer of Toul, who may with truth be regarded as the founder of the method of stereotyping, now practised in France. Some numbers of the *Journal* having fallen into his hands in the year 1785, he was so struck with the advantages which the new process promised, that he immediately instituted a series of experiments, which were attended with such success, that, in a short time, he published editions of several large volumes from plates made by his own peculiar process. These editions he called *omotyped*, signifying the junction of many types in one.

Carez at first attempted to accomplish his object by means of moulds of plaster taken from pages of types; but he soon abandoned this method, and after many experiments adopted a process, which is satisfactorily explained in a letter to M. Camus, from M. Caffarelli, an intimate friend of M. Carez, and who had often witnessed his proceedings.—The page, after being composed in the usual way with moveable types, and carefully corrected, was inclosed in an iron chase, in which it was firmly held by screws. It was then attached, with the face downwards, to the underside of a block of oak wood, suspended from one arm of an iron lever, or swing beam *(bascule)*. Upon the top of a wooden pillar, resting on the ground and immediately underneath the page, there was placed a thin card or paste-board tray, rubbed over with oil. The workman then took, from a furnace close at hand, a quantity of melted type-metal, which he poured into the paste-board tray, and attentively watched its cooling. The moment that it began to be covered with a slight cloud, he let the block of wood and page fall upon it, and thus an impression, *en creux*, of the page was formed. The whole was then detached from the block; the page and the plate were separated, which was done very readily; and the plate was carefully examined. The workman then took off what was necessary, cut down the edges, and lastly fixing this plate to the under side of the block, or *ram*, he let it fall upon some fused metal, placed as before on the sole of the machine, and thus obtained a plate, in relief, fit for printing with. This plate was then carefully examined, and cleaned; its edges were cut off, sufficient being left at top and bottom to afford hold for a screw. The plate was then reduced by a plane, to a determinate thickness, which was scarcely the twelfth of an inch below the neck of the letter. In this state, when wanted, it was attached by screws to a block of wood properly adjusted, and impressions taken from it in the usual manner.

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* Camus, *Hist. de la Stér.* page 55—58.

† Carez was returned, in 1791, by the department of La Meurthe, to the first Legislature; and was a member of the Committee on Assignats. He was sub-prefect at Toul, in 1801, in which year he died.

In 1786, Carez executed by this process an edition of a church-book with the notes *(livre d'eglise noté)*, in two volumes, large 8vo. of more than 1000 pages each; and subsequently printed in the same manner twenty liturgical volumes, or instructions for the use of the diocese. On his return home, after attending his duties in the first Legislature, he finished in the same manner an edition of a classical dictionary and of an octavo bible on the sized type called nonpareil. M. Camus has inserted an impression, taken from a plate of this bible. It is a full sized octavo page, being 7 inches long and 4 broad, divided in two columns. It conveys a very favourable idea of the success with which Carez had prosecuted the art; it being, as Camus justly remarks, surprising to see, with what clearness, types, so very small and so close, have been rendered by stereotyping.

From two authentic documents, which Camus inserts, it appears, that Carez had completed his process, and was successfully practising it, in the autumn of 1787.*

The arbitrary manner, in which Hoffmann was deprived of his establishment in 1787, did not discourage him from further prosecuting the art. In 1792, he applied to the Minister of the Interior for a patent, for the exclusive exercise of a new process which he had invented. "The processes, which he had before made use of," says he, in the memoir which he presented on this occasion, "gave him no other advantage than permanent editions. For as, before he could make his polytype plates, he had to incur the expense of composing and correcting, as in common printing, no saving was derived from this mode of printing, but rather an increase of expense, which was not always compensated by the power of preserving the edition." Hoffmann, therefore, was desirous of discovering a more ready method of producing solid plates than by the operation of common printing.

For this purpose he prepared two kinds of types, or punches, for making the impressions of letters in his moulds. The first kind consisted of single types, such as are used in printing; the second of the same letters, but joined together so as to form the syllables of the most frequent occurrence in the French language, such as, *ais*, *etre*, *eurs*, *ment*, *&c.* This union of many letters in a single type gave him the power of impressing several letters at once, each of which would otherwise have required a particular motion. He called the art of making moulds from his types, the *art of polytype;* and that of joining many letters together, the *art of logotype.*[*]

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* Camus, *Hist. de la Stér.* pages 58—65.

Each of his types was fixed in a block of copper, which, by its incisions and notches, furnished the means of placing it at a right angle upon the piece of clay intended to form the mould, and of sinking it perpendicularly and to a precise depth into it.—Hoffmann also prepared, in a similar manner, a knife, or plane, for the purpose of making a trench in the clay, before sinking the types into it, and of thus removing the excess of clay, which would otherwise have choaked the face of the letters.

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[*] The idea of joining the letters, forming the words and syllables of the most frequent occurrence, into one type, Hoffmann appears to have adopted from a book published by M. Saint Paul, at Paris, in 1776, entitled *Noveau Systéme Typographique, ou Moyen de diminuer de moitié le Travail et les Frais de Composition, &c. decouvert en* 1774, *par Madame de* * * *; and from *An Introduction to Logography*, published at London, in 1783, by Mr. Henry Johnson. A patent for this mode of printing was soon after taken out in England, by Mr. Walter, and some books were printed in this manner, but it was soon abandoned.

A piece of clay, (prepared in the manner described at page 56,) was pressed into a frame of copper, attached to which was a moveable copper rule.—This rule being fixed at the bottom of the first line, the knife was slid along it, and the space of the line marked out. Each type, that was necessary, was then sunk into the clay, care being taken to hold it against the rule in such a manner, that by means of the notch, in which the rule fixed itself, the impression was always upright and of an equal depth.—Such, were the means, which Hoffmann adopted to avoid the expenses of the composition of the pages; and with three hundred and seventy types to compose plates sufficient for the printing of a volume.

The manner of obtaining plates from the moulds, when completed according to the above process, is thus described by him:—" Nothing more is required than to attach the mould to a stamp or screw-press, in the manner of a seal or die, and to put it in a chase which rises about half a line above the mould, and forms a frame for it. The mould being thus disposed, some of the alloy of lead, bismuth, and tin, must be melted, and, when it has so far cooled, that it will not burn a piece of card, it must be poured into a large paste-board tray, placed before the press. Whilst yet fluid, the edges of the metal must be unceasingly brought with a very thin copper trowel into the middle, in order that it may cool equally; and, when the whole is in the state of sealing wax fit to receive the seal, the tray is placed under the press, and by a single turn of the screw, a solid plate is formed, bearing exactly the impression of the earthen mould. The pressure ought to be given at the very instant of cooling."

A note, written upon one of the copies of the memoir of Hoffmann, states, that on the 16th of February, 1792, a patent was granted to him for exercising, during 15 years, the "*art polytype et logotype*." He afterwards conveyed this grant to John Daniel Saltzmann, by an act of the 24th of November, 1792, made before Laquiante, notary of Strasburgh.*

It does not appear, that any works were ever executed according to this process; indeed it is most probable that there never were any, for it must be evident to every one at all acquainted with printing, that it never could be successful. For independent of the extreme and, I should think, insurmountable difficulties of sinking each letter into the mould exactly perpendicular, and neither too distant from, nor too near to, its adjoining letters, and all of them to the same exactly determinate depth, the thickness of the thinnest possible piece of paper making a material difference in printing,—it would be utterly impossible to preserve the square appearance of a page; for as the person, who was forming the mould, would never know, until he arrived at the end of a line, how many letters it would contain, he would be reduced to the necessity of either making improper divisions, or of leaving the lines of unequal lengths. And it may well be doubted, whether the labour and time, required for the formation of such a mould, would not be infinitely greater than for the composition of a page.

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* Camus, *Hist. de la Stér.* pages 66—72.

Many French artists after Hoffmann continued to make experiments in the processes of polytype and stereotype printing. Of these the most deserving of notice was Gengembre, afterwards engineer to the Mint. His first experiments were made in 1789, but their course was interrupted by a voyage, which he made to America in 1791. The object of the first process, employed by this artist, was to obtain, from a simple design, or from a page of writing, a plate which might be used like a copper-plate engraving. With a composition of martial æthiops and colcothar, ground with very pure linseed oil, he wrote, or drew his design, upon a polished plate of copper. He allowed the composition to begin to dry in the air, and then to complete the drying and effect the baking of the oil, he placed the plate upon a chafing-dish of burning charcoal, taking care, that the plate was not heated to such a degree as to destroy its polish. In his first attempts, Gengembre procured an impression of the traces thus made upon the plate, by pouring into a paper-tray some melted alloy of lead and tin, and when the metal was beginning to cool, placing upon it the plate of copper, and passing both through a rolling-press. This pressure indented the design or writing in the alloyed metal, and produced a plate, from which impressions might be taken as from a copper-plate.

After his first essays, Gengembre entered into partnership with his brother-in-law, Herhan; and they continued their united labours both before the departure of Gengembre for America, and after his return from that country. Instead of the martial æthiops, they used emery or earth of Cologne, (a species of ochre). But the greatest change, which they introduced into their processes, related to the manner of applying the pressure. Instead of passing the plates through a rolling-press, they applied a perpendicular pressure by a screw-press.* Having poured the melted tin into a paper-tray, a little larger than the plate of copper bearing the design, as soon as a pellicle had formed itself upon the surface, it was removed; the tin was thus rendered as bright as glass. When it began to cool, they placed the copper-plate upon it, and submitted both to the action of the press.

Gengembre and Herhan also endeavoured to attain their object in the cold way. Having traced the design or writing, with the liquor already noticed, upon a plate of copper, hardened by alloy and hammering, they placed it upon a plate of soft copper, and passed both between the rollers of a flatting-mill. The soft plate thus received an indented impression of the subject drawn on the hardened plate.

To M. Camus's *Histoire*, as published in the *Memoires de l'Institut National*, there are annexed impressions taken from plates executed by Gengembre and Herhan. They have much the appearance of chalk drawings.

The processes, which have just been described, are, it is evident, merely a more skilful application of the means before employed by Franklin and Rochon. The next operation, however, of Gengembre, the result of which was to obtain, from a single plate engraved *en creux*, many other plates, also *en creux* and quite identical, must be regarded as an invention. This was accomplished in the following manner:—A head of Ceres was engraved upon a plate of steel, which was afterwards hardened. Upon this engraved plate of steel was placed a plate of copper, hardened by being alloyed with a sixteenth part of copper, (he afterwards made use of a plate hardened by a different alloy); these being submitted to the action of a screw-press, the plate of copper received a copy, or impression, in relief, of the engraving on the steel plate. He then took a plate of rose-copper well annealed, and placing it upon the plate of hard copper, passed both between the rollers of a flatting-mill, taking care that the pressure should be perfectly equal. By this means he obtained as many plates, in relief, or *en creux*, as he wished. Gengembre communicated his process to Herhan and to Meunier, and it was afterwards extensively applied in the fabrication of assignats.

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* *Screw-press* is the technical name given in the arts to a press, the screw of which is furnished with arms loaded at their ends with iron balls, in the manner of the press formerly used for coining.

For the fabrication of the notes issued by the *Caisse Patriotique*, in 1791, some new processes were invented by Gengembre. Being required by the directors of this board to execute, at the least possible expense, notes, which it would be difficult to counterfeit, he employed, in the first instance, Hoffmann's process for stereotyping in conjunction with his own first process. The body of the note was printed from plates, stereotyped by Potier de Lille, who had been one of Hoffmann's workmen; and the original signatures, having been written upon a plate of copper, with the liquor composed of martial æthiops, were polytyped by Gengembre, and printed at the rolling-press; these notes had therefore to pass through two different presses.

When the *Caisse Patriotique* issued its notes for 50 sous, of the date of July 14, 1791, Gengembre invented his third process, which was quite original. The size of the note was about four inches long by two broad. The whole of the text and ornaments of the note he caused to be engraved, in relief, upon a plate of steel; all the letters and ornaments were joined together.* When the engraving was finished, the plate was hardened, and sunk, by the action of a screw-press, into a mass of copper hardened by an alloy of platina. Plates, composed of lead alloyed with a little tin, being then placed upon this matrice, and submitted to the action of the same press, acquired the same relief as the original plate of steel. These plates, being dressed at the back, were then mounted upon square blocks of wood, and thus rendered fit for use after the manner of letter-press printing. From the copper matrice as many plates, as might be wished for, could be obtained; a great number of them were indeed necessary, as the metal, of which they were formed, not being sufficiently hard, could not long sustain the action of the printing press.*

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* The motive, which induced Gengembre to join all the characters together, was to make forgers despair of imitating them, from the almost absolute impossibility of not making a fault in the construction of their note. When the characters or ornaments are separated, an artist, whether an engraver on steel, or on wood, easily recommences a piece, in which he has committed a

We have now approached a period extremely important in the history of the stereotype art. The necessity, which the French Government felt of

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fault, and re-unites it to the other part of his work. In a note, however, where every part is joined by evident but fine strokes, if the engraver, on any point whatever, has by a false stroke cut away the part, which ought to contribute to the junction, the plate becomes entirely useless, and he must commence afresh. The plugs, which engravers on wood sometimes make use of, would but ill succeed, when a single line only is to be presented.—*Camus, page* 79.

* Camus, *Hist. de la Stér.* pages 72—81.

guarding against forgery in the immense issues of assignats, which were made at the commencement of the Revolution, called forth the abilities and exertions of the most skilful artists, who not only successfully applied all the inventions and processes of their predecessors, but discovered others, which, however, they may have answered their original purpose, have at least powerfully contributed to the improvement of the French method of stereotype printing. Of these exertions M. Camus gives a somewhat detailed account, and as it is curious in itself, and interesting with regard to the object of my present enquiry, I shall keep as close to his text, as a due regard to conciseness will allow.

The first issue of assignats, decreed by the Constituant Assembly, in 1790 and 1791, was printed by Anisson, director of the printing office, at the Louvre; the second issue was printed by Didot, the elder. The body of the assignat was printed with common printing types, but in order to render them more difficult to be counterfeited, a copper-plate engraving of the head of the King was added. The number of copies being too large to render it possible that they could be printed from one form, and still less from one engraved plate, Saint-Aubin, a celebrated engraver, was required to furnish three hundred copper-plates bearing the medallion of the head of the King, and the printers were obliged to set up the form of the body of the assignats as often as they judged necessary. The assignats were scarcely issued before they were counterfeited. An examination of these counterfeited assignats shewed, that the government itself was the original forger, since, excepting the original plate made use of, all the others were but imitations and copies.

The dangerous consequences thus resulting from a number of plates resembling each other, but not identical, becoming more evident in proportion as the issue of assignats was more extended, the Legislature, which succeeded the Constituant Assembly, was seriously occupied with the endeavour to remedy the inconveniences, arising from the counterfeiting of the government. It directed its attention to the attainment of a principal object and of others accessary to it.

The principal object was to provide, that the whole of one issue of assignats should be printed with forms or plates not imitative and alike, but *identical.* This object could only be attained by these forms being all the mechanical product of a single punch or matrice, multiplied as many times as the number of copies to be printed rendered necessary.

The accessary objects were, to diminish the danger of forgery, by employing, for the fabrication of the assignats, processes either very difficult to discover and to unite, or very expensive; to accelerate the printing of them by employing one press only, although the assignat consisted of impressions taken from an engraving *en creux*, and from characters in relief; to number the assignats at the press, and in such a manner that the numbers should follow in succession, without the plate being required to be touched by the hand, &c. &c.

A report, made to the Legislature by the Committee of Assignats, on the 4th of February, 1792, gives some idea of the state of the first attempts.—The Committee declare, that they had succeeded in two important points,—the one relating to the striking of the matrices of the characters,—the other to the multiplying of the engraved plates. With regard to the first point, the letter-cutters, accustomed to the cutting of a single letter only on their punches, felt great difficulty in engraving, on one punch, an entire word of any extent, and still more many words, the letters of which were all joined together,—in striking with this punch a matrice, which should be perfectly true,—and in casting the characters from the matrice. Gerard, a letter-cutter, succeeded perfectly in overcoming these difficulties;* and Gatteaux, a die-sinker, was not long in engraving steel punches, bearing ornaments of a considerable size; with these he formed, by means of the screw-press, good matrices in steel or copper.

With regard to the second point, the copper-plate engraving, advantage was taken of the invention of Gengembre for polytyping plates engraved *en creux*. Fiezinger, author of a collection of portraits of the members of the Constituant Assembly, made attempts at engraving upon steel; and by the processes, described at page 75, he obtained plates, perfectly identical.

The Committee of Assignats soon after made a second report, but it does not appear, that it contained any information upon the subject of their labours. A short time before the close of the session, the Legislature issued a decree for the formation of a general establishment, in which all the processes and operations, for the fabrication of assignats, should be carried on. The Capuchin Convent was fixed upon as the seat of this establishment; and on the first of March, 1793, four public agents for the making of assignats were appointed; namely, the keeper of the national archives, a director of the artists, a director of printing, and an inspector of stamping. To the director of the artists, Citizen Guillot, was assigned the superintendence of that branch of the operations which has a relation to our present enquiry.

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* Gengembre had been equally successful, as is shewn at page 75, in the execution of the note, for 50 sous issued by the Caisse Patriotique; but he was at this time absent, and without doubt the processes employed by him in the fabrication of this note were not known.

This establishment having been formed, and the abilities of the several artists having been called into action, their united labours were crowned with tolerable success.* The process, which soonest attained perfection was the polytyping of engraved plates, meaning by such term the compound operation of obtaining, from one original plate engraved *en creux*, by the placing of another plate of copper upon it, plates in relief, which were called *mother-punches*, from which were furnished by a second similar process, plates *en creux*, called *daughters*, or secondary plates. These latter were used for printing with, the same as plates which had been engraved by the hand.

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* Notwithstanding all the precautions for the prevention of forgery, many millions of assignats were fabricated here, and sent to France, where they passed current, till the fatal Quiberon Expedition, I believe, when several kegs having floated ashore, were eagerly seized, as supposed liquor,—but when opened, were found full of assignats. Glindon, a person residing in Orange Court, Haymarket, London, was the printer, and employed, I have been told, 5 presses! This was a scheme of the Ministry to ruin the French finances.

Various processes were successively employed in the execution of this polytyping. Meunier, for the assignat of 25 francs, made use of plates of steel engraved by Fiezinger, bearing two medallions upon the same plate. From this plate, by means of the screw-press, both mother plates, or punches, and secondary plates were obtained. The size of the plate, however, rendered the operation both long and troublesome. Meunier having joined the army, was succeeded by Droz. Instead of one plate bearing two medallions, he caused a plate for each medallion to be engraved. From these he obtained a punch of steel in relief, and by means of pieces of copper fixed into a ferrule, engraved plates were struck with this punch, with as much ease as counters. These processes were executed by Herhan, under the superintendence of Meunier and Droz.

M. Camus directs the attention of his readers to an engraving upon the assignats for 400 livres, the principal object of which was a spread eagle, and to a figure of France upon those for 50 livres, both of them engraved by Tardieu, from designs by Gatteaux; and after desiring them to observe the size of each of these pieces, and the delicacy and fineness of the strokes, says, he thinks, they will learn with astonishment the declaration of Guillot, the director of the artists, that from the authentic records of the daily operations, it appeared, that Herhan, who executed the polytyping of the engravings on these assignats, had polytyped, for the 400 livres assignats, 897 *mother-punches* (in relief) and 1487 secondary punches *(en creux)*, of which number 190 were defective;—and that, for the 50 livres assignats, he polytyped 4760 mother-punches, and 7684 secondary punches, 1140 of which number were defective. This fact, he thinks, proves, how much more advantageous it must have been to have polytyped the original plate, rather than to make thousands of copies of it.

The stereotyping of plates, or forms, in characters in relief, for the purposes of letter-press printing, was attended with much greater difficulty, and gave rise to many unsuccessful efforts. The difficulties to be overcome, are thus enumerated by M. Camus:—

1. It is seldom that a mould of sand, earth, or clay, which has received such shallow, straight, and angular impressions as those of printing types does not experience, on drying, a warping and contraction which alter the shape of the letters.

2. It often happens, that a mould cracks and

splits, if, in order to dry it, it be exposed to too strong a heat.

3. It is extremely difficult to make the melted metal penetrate into a mould of this kind; the air, which fills the letters, having no point of escape.—This renders the angles obtuse, and the letters round. This inconvenience may be remedied, by rubbing the face of the plate, when taken from the mould; but care must be taken, not to take off too much of the face.

4. One means of forcing the metal to enter into the angles of the letters, would be to strike a steady, and smart blow with the mould upon the melted metal; but it is difficult to avoid breaking a mould of clay, especially if it is of any size.

5. A matrice of metal admits of being struck; but, in the first place, how is this melted matrice to be obtained? In the second place, what metals must be made use of, in order that they may have the necessary hardness, if the operation is performed with cold metal, and that they may not adhere to each other, if with hot metal? In the third place, what contrivance must be invented to strike a smart, firm, and perfectly perpendicular blow?*

The means, which appeared the most simple of overcoming these difficulties, and to which the several artists directed their efforts, consisted in uniting the separate matrices of all the parts of the assignat, the letters, words, and ornaments, in order to form, from these united parts, one whole and single matrice, with which the melted metal could then be struck *(clicher)*.* When these several parts were properly justified and fitted together, they were mounted upon a sole of copper, or steel, and inclosed within a steel frame, or box, the sides of which projected a little above the face of the matrice. A plate† was then obtained from the matrice by means of the stereotyping, or *striking*, machine, which was thus constructed and used :—

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* Camus, *Hist. de lă Stér.* page 95.

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* "This expression," says M. Camus, "which was much used at that time, is not to be found in the dictionaries; though I am assured by some persons, that the die-sinkers make use of it, to express the striking of melted lead, in order to obtain a proof of their die. It signifies, to let a matrice fall perpendicularly, suddenly, and forcibly, upon melted metal, in order to obtain an impression of the matrice. The *clichage*, effected by the machines, which are now in use is the grand point of stereotyping. It is the only means, or at least the most sure means of obtaining, from matrices, of a single piece, plates of a perfect relief."—*Camus, page* 97.

As I am at present ignorant of any term, in the English language, either technical or otherwise, answering to the signification of the word *clicher*, I shall translate this verb, by the verb to *strike*, and adopt the participle *striking*, to express the operation of *clichage*.

† These processes were first made use of for the assignats of 400 and 50 livres, the issue of which was decreed on the 21st of November, and the 14th of December, 1792.

A table was firmly fixed, as high as the hand; and upon the back part of it, two pieces of wood, of a convenient height, were erected, in such a manner as to leave a groove, or canal, between them.—Between these two uprights, a mass of wood was made to ascend and descend, in the same manner as the ram of a pile-driving engine. In the under surface of the block of wood, and perpendicular to its axis, there was fixed a screw, which, by fitting into a female screw, on the back part of the box, inclosing the matrice, attached it firmly to the block of wood, or ram. The face of the mould was thus turned downwards. The ram was raised by means of a wince and handle; and a tray of strong paper was placed upon the table, immediately below the ram. Into this tray some melted type metal was then poured, and the sides of the paper alternately raised to cause the metal to flow from the edges towards the middle. When the metal was upon the point of becoming fixed, the pulling of a trigger disengaged the ram, which then slid down between the two uprights, and fell with all its weight upon the metal. The ram was afterwards raised, and the metal separated from the matrice with the blade of a knife; there was thus formed a plate, bearing in relief the imprint of the matrice. The frequent repetition of this operation produced the requisite number of plates, all perfectly identical.

In order to protect the workman from the sparks of hot metal, which were thrown out on the fall of the ram, the part, where the metal was placed, was inclosed within doors of thin iron plate, which were shut before the trigger of the ram was struck, and which enveloped it at the moment of its reaching the table.

The plates, obtained by this process, were about three quarters of an inch thick. They were afterwards soldered upon a block of lead, to render them of a sufficient height; but it was necessary to first dress the back of the plate, and the face of the block. This was done in a turning-lathe. The plate being fixed on a mandrel, the point of a flat-pointed graver, or cutter, borne upon a carriage, was presented to the centre of the back of the plate. The lathe being put in motion, the graver was made to move gradually from the centre of the plate to its circumference, and thus to travel over, in concentric circles, every part of its surface, reducing it all to the same level. Both sides of the leaden block were dressed in the same manner.

After the machine had been some time in use, it was thought desirable to effect a greater degree of pressure, at the moment of *striking*, by a re-action of the table against the ram. The feet of the table were in consequence fixed into boxes, containing spiral springs; these, being compressed by the fall of the ram, compressed in return, by their re-action, the still hot metal against the matrice.

In proportion as the identity of the plates was rendered perfect, the danger was increased of any of them being secreted. It, therefore, became necessary, either that inspectors, on whom reliance could be placed, should be constantly present, during the whole time that the operation of *striking* was in progress; or that a machine should be invented, which would keep a correct account of the number of blows struck by the ram in a certain interval of time, and consequently of the number of forms stereotyped within that interval. This object was effected in the following manner:—Upon one of the upright cheeks of the stereotyping machine a crank was fixed, on one arm of which a blade, or tongue, from the ram, necessarily struck, if the ram descended only three inches. The other arm of the crank communicated its motion to other cranks, putting in motion wheels, which moved an index, placed in the private office of the director, and inclosed in boxes, of which he alone held the key. The examination of the index and its dial plate shewed him, with certainty, the number of forms, which had to be accounted for.

It was by these modes, that the plates and forms of the assignats, decreed by the Convention, were stereotyped and printed. The same machines and the same processes were afterwards used for the execution of the mandats, established by the law of the 7th of Floreal, of the year 4 (1796).* After the suppression of the assignats and mandats, a great part of the materials, designed for their fabrication, were destroyed, but some of the matrices were deposited in the Museum of Antiquities, and in the Conservatory of Machines. These are so much injured, that an impression, in a state fit for service, could not be taken from them; but they serve to shew the manner, in which the separate matrices of each ornament, type, signature, &c. were united and fixed, in order to form one single matrice.—Some of the stereotyping machines were conveyed to the Conservatory of Machines; and others to the printing office of the Republic.† These latter machines were afterwards employed in the stereotyping of *bons* and other finance papers, with matrices formed in the same manner as those of the assignats and mandats. The vignette and the seal of the *Bulletin des Lois*, were printed from plates stereotyped with a copper matrice, formed by a punch of steel. The plates of the vignette were fastened upon a block of lead by two screws (a method which M. Camus says is highly preferable on many accounts to soldering); and an opening was left in it to receive the number, which was changed for each bulletin.*

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* At this time M. Camus was the keeper of the national archives, and the law, authorising the issue of the mandats, ordered that none of the operations should be effected except in his presence. He thus acquired such a knowledge of the several processes, as, with the other information, which he was able to collect, enabled him to write a general history of stereotype printing.

† Camus, *Hist. de la Stér.* pages 82—106.

The formation of a single matrice from the junction of many separate pieces, being exceedingly troublesome and expensive, Guillot formed the project of trying to sink each punch separately into a block of copper, by means of a machine which he called *graphitype*. It does not appear, however, that such a machine was ever formed, or at least was ever made use of.†

On the occasion of the second lottery of national houses, decreed by the Convention in the year 3 (1795), it was deemed desirable, that the tickets should be identical; and the shortness of the time not permitting, either the engraving of punches, or the making of copper matrices, Gatteaux, who was charged with the preparation of these tickets, composed the text of them with common printing types, which he firmly fixed in a copper mandrel. With these he obtained, by the operation of *striking*, a matrice, and afterwards a plate bearing the characters in relief. He also obtained, in the same manner, a plate of one of the pages of the *Logarithmes* of Borda, at that time in a course of publication, containing more than 3000 figures. But the success of this process was impeded by two obstacles; namely, first, the great nicety required to make choice of a proper alloy and degree of heat, in order that the cold plate, when *struck* upon the melted metal, should not become softened and adhere to it; and secondly, the difficulty of avoiding air-holes in the plate, which is the final result of the operation.—Gatteaux consulted with his brother-in-law, Anfry, and Firmin Didot,* on the best mode of overcoming these difficulties; and the result of their united deliberations was, that the only means of avoiding air-holes, more difficult to prevent in the *striking* of the matrice, than in that of the plate, would be to sink the face of the page of types into a plate of cold metal, by means of a screw-press. The common type-metal being too soft to bear this operation, Anfry formed a harder metal, with which he cast a sufficient quantity of types to compose a small page. Gatteaux, having fixed this page into a frame, or mandrel, used it as a punch, and impressed it, by means of the screw-press, into a plate of lead.—This operation was performed on the 30th Brumaire, in the year 6 (1798), in the presence of Firmin Didot, Anfry, Vannier, and André. The matrice proved to be without any defect, and the types were not injured.

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* Camus, *Hist. de la Stér.* page 127.

† Ib. page 106.

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* In the year 1795, Firmin Didot published an edition of the *Tables des Logarithmes*, by Callet, which he announced as a stereotyped work. But it certainly was not a book of this description, at least in the common acceptation of the term, it having been merely printed from pages of types, which after being corrected with the greatest care, were immediately rendered a solid mass, by the bottoms of the types being soldered together, much in the same manner as was practised by Van der Mey, in Holland,

The compound metal, formed by Anfry, being very expensive, on account of the silver, which entered into its composition, Herhan, who worked with Pierre and Firmin Didot, prepared another alloy, infinitely less expensive. The experiment

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about the beginning of the last century, as described in page 7. The title of this book was as follows:—*Tables portatives des Logarithmes . . . . par F. Callet, edition stéréotype, gravée, fondue, et imprimée par Firmin Didot. Paris, F. Didot*, 1795, *an.* 3, in 2 vols. large 8vo.

was repeated with types formed of this alloy, with equal success.

After this result, Louis-Etienne Herhan, Firmin Didot, and Nicholas-Marie Gatteaux, obtained individually patents for their inventions.

The patent of Herhan was dated on the 3d Nivose, in the year 6 (1798). The preamble of the patent describes a new process for founding solid plates invented and executed by him, in the month of Messidor in the year 5 (1797). This process will be fully explained hereafter. In consequence of his statement, a patent *(brevet d'invention)* was granted to Herhan for fabricating and making use of solid plates, proper for printing with, according to the process which he described.

The patent of Firmin Didot, which is dated on the 6th of Nivose, was granted for 15 years, for the making and issuing stereotype forms and editions of books.

The patent of Gatteaux was dated on the 29th Pluviose, and granted for 5 years. Gatteaux declares himself in it the inventor of a process for multiplying pages of letters by means of solid plates, under the denomination of *monotypage*, or "*caracteres frappés.*"

A short time after their patents were obtained, Pierre Didot (the elder), Firmin Didot, his brother, and Louis-Etienne Herhan, published a *Prospectus* of their stereotype editions. In this they announced that they had entered into a partnership for the purpose of applying themselves, with more effect, to the practice of the new processes, for which they had obtained patents. They also boasted, that their stereotype editions would possess the merit of correctness, which might, indeed, be carried to the highest degree of perfection, because any error, which might escape observation in the first impression, could be easily corrected as soon as discovered. They engaged to sell stereotyped plates, either of the 18mo. or 12mo. sized page. The first work, which they proposed to publish, was an edition of *Virgil*, in 18mo. comprised in about 400 pages; copies of which work, illustrated with a map and vignettes, they intended to sell at 15 sols. The stereotype plates for printing it they offered at the rate of 3 francs each page, "so that for about 1200 francs the complete materials for the works of *Virgil* might be had, all composed in solid forms ready to be submitted to the press." In case any of the plates should require to be altered, or should be lost, they engaged to furnish a new one for 10 francs. The authors of this Prospectus also announced, as an additional advantage of their invention, that, if a volume of any set should be unfortunately lost, they could easily supply its place, from the plates constantly remaining in their hands. This they engaged to do for the original price of the volume.

The publication of this Prospectus excited many critical observations. Their discovery was denounced, as tending to degrade the art of printing, by causing it to retrograde, since it never could produce impressions as beautiful as those taken from the types themselves; and it was asserted, that without any real advantage to those, who announced it, it would be ruinous to all, who attempted to make use of it. The calculations, with regard to economy, were combated, as absolutely false.

In the mean time the three partners continued their labours, and in the course of 1798, published their edition of *Virgil*, at the price of 15 sols, on common paper. They soon afterwards published an edition of *Phædrus*,* which has been followed by a long series of other works, too well-known throughout Europe, for their cheapness and neatness, to require particular enumeration here. That the publishers have completely fulfilled their promises to the public, as far as regards the cheapness and beauty of their work, is sufficiently evident; but whether their own expectations of emolument have been gratified, it is not easy, perhaps, to ascertain.

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* Camus, *Hist. de la Stér.* pages 109—117.

The process, pursued by these partners, is described at considerable length by M. Camus, who was permitted by them to witness their operations, without any restriction as to secrecy, except with regard to the composition of the alloyed metals, of which their types and matrice plate were formed. The following is an abstract of the most important parts of this description:—

After the page has been composed, in the usual way, with types formed of a peculiar and hard alloy, and properly corrected, it is disengaged from the chase, and inclosed in a box of steel, in which it is compressed on all sides, after being well *planed.*—Between the sides of the page and the box, there is inserted a band of very thin copper, a little higher than the face of the types.* The page, when thus disposed, is placed, with its face downwards, upon a plate of metal, and both are submitted to the action of a press, of the kind used in coining. The pressure is applied slowly and smoothly; all the letters enter the plate at the same time, so that the metal is not squeezed from the hollow of one letter into that of another, but any bulging out, that occurs, takes place in height between the lines and the words. A matrice is thus formed in the plate of metal; and the use of the copper, I presume, is to form the matrice of the required size, and to separate it from the superfluous portion of the plate.—The metal, which composes the matrice plate, ought to possess two essential qualities:—to be capable of receiving a clear and sharp impression,—and not to be liable to any alteration, or incipient fusion, when it comes in contact, during the operation of *striking*, with the hot metal.

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* From what follows it would appear, that pieces of wood, or metal, must be interposed between the sides of the page and the band of copper.

When the page and matrice are disengaged, the latter is carefully examined with a magnifying glass, and when any letter is discovered, the impression of which is not sufficiently marked, a type of the proper kind is taken, and with a blow of a small hammer is struck into the imperfect mark. When the matrice is considered in a fit state, it is fixed in a chase by screws, and surrounded with a frame *(virole)* of steel, which determines both the size and thickness of the future plate. It is then attached to the screw of the ram of the stereotyping machine, as before described, and submitted to the operation of *striking*.

The plate, on being detached from the matrice,* is adjusted to the proper size, by the edges being smoothed and dressed off slopingly by a plane, similar to those used by type-founders. This is done in a frame, formed upon a plate of copper by steel rules, which can be fixed by screws at such places as may be desired.—The plate is then placed upon a second machine, upon which the spaces, which remain between the title lines or at the ends of paragraphs, and which might blacken, when printing, are reduced. This machine is composed of two pieces; one perpendicular, to which the plate is fixed by means of a mandrel; the other horizontal, on which rests the tool for cutting away the superfluous parts. The movement of a handle causes the plate to rise and fall, and by the action of the cutting instrument against it, the high parts are cut away to the required depth.

A proof is then taken of the plate. If any faults are discovered, which have escaped observation in the correction of the page, from which the matrice was taken, the faulty letter is cut out with a graver, a perforation is made in the plate, and a proper type, taken from amongst those used to compose the pages, inserted in its place. After it is justified to the proper height, the superfluous part of its body is broken off, and it is soldered to the plate by rubbing the back of it over with a hot iron.

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* This is done with the blade of a knife, in the manner before described. M. Camus condemns this practice, because the plate is not removed perpendicularly; it is removed by degrees, and each side of it makes, at each stroke of the knife, an angle with the matrice. The face of its letter, therefore, rises out of its matrice sideways, and hence its perpendicularity is broken, and the angles rounded. It is for this reason that the letters on the sides of the pages often appear less perfect than those in the middle.—*Camus*, *Hist. de la Stér. page* 120.

The back of the plate is next dressed in a lathe, in the manner before described (page 88), and the plate is justified to its proper height *to paper*. A steel guage being formed of the proper height, and being placed on a stone, the plate is adjusted so as to pass freely under it.

On ordinary occasions, when not much attention is paid to the neat execution of a work, the plates are attached by screws or pins to small blocks of walnut-tree wood, and these are imposed with *furniture*, in the usual way. But when more attention is bestowed upon the execution, they make use of a table of copper, on which rules of copper or steel, *beveled*, or slanted off, on their under edges, are fixed; these supply the place of the *furniture*, used to form the margins. The plates are arranged between these rules; and as the upper part of their edges is also *beveled* off, they are easily adjusted

bloit contrarier si fort sa direction, qu'il falloit, selon moi, que l'aiguille déclinât prodigieusement. Je le dis au capitaine: il battit la campagne en se moquant de moi; et comme la mer devint haute et le temps nébuleux, il ne me fut pas possible de vérifier mes observations. Nous eûmes un vent forcé qui nous jeta en pleine mer: il dura deux jours; le troisieme, nous apperçûmes la terre à notre gauche. Je demandai au patron ce que c'étoit. Il me dit, Terre de l'Eglise. Un matelot soutint que c'étoit la côte de Sardaigne; il fut hué, et paya de cette façon sa bienvenue: car, quoique vieux matelot, il étoit nouvellement sur ce bord ainsi que moi.

Il ne m'importoit guere où que nous fussions; mais ce qu'avoit dit cet homme ayant ranimé ma curiosité, je me mis à fureter autour de l'habitacle pour voir si quelque fer mis là par mégarde ne faisoit point décliner l'aiguille. Quelle fut ma surprise de trouver un gros aimant caché dans un coin! En l'ôtant de sa place, je vis l'aiguille en mouvement reprendre sa direction. Dans le même instant quelqu'un cria, Voile. Le patron regarda avec sa lunette, et dit que c'étoit un petit bâtiment françois. Comme il avoit le cap sur nous et que nous ne l'évitions pas, il ne tarda pas d'être à pleine vue, et chacun vit alors que c'étoit une voile barbaresque. Trois marchands napolitains que nous avions à bord avec tout leur bien pousserent des cris jusqu'au ciel. L'énigme alors me devint claire. Je m'approchai du patron, et lui dis à l'oreille: « Patron, si nous sommes pris, tu es mort; compte là-dessus ». J'avois paru si peu ému et je lui tins ce discours d'un ton si

Specimen of M. Didot's *Stereotype.*

posé, qu'il ne s'en alarma guere, et feignit même de ne l'avoir pas entendu.

Il donna quelques ordres pour la défense; mais il ne se trouva pas une arme en état, et nous avions tant brûlé de poudre, que, quand on voulut charger les pierriers, à peine en resta-t-il pour deux coups. Elle nous eût même été fort inutile; sitôt que nous fûmes à portée, au lieu de daigner tirer sur nous, on nous cria d'amener, et nous fûmes abordés presque au même instant. Jusqu'alors le patron, sans en faire semblant, m'observoit avec quelque défiance; mais sitôt qu'il vit les corsaires dans notre bord, il cessa de faire attention à moi et s'avança vers eux sans précaution. En ce moment je me crus juge, exécuteur, pour venger mes compagnons d'esclavage, en purgeant le genre humain d'un traître et la mer d'un de ses monstres. Je courus à lui; et lui criant, « Je te l'ai promis, je te tiens parole », d'un sabre dont je m'étois saisi je lui fis voler la tête. A l'instant, voyant le chef des Barbaresques venir impétueusement à moi, je l'attendis de pied-ferme, et lui présentant le sabre par la poignée, « Tiens, capitaine, lui dis-je en langue franque, je viens de faire justice; tu peux la faire à ton tour ». Il prit le sabre, il le leva sur ma tête; j'attendis le coup en silence: il sourit, et me tendant la main, il défendit qu'on me mît aux fers avec les autres; mais il ne me parla point de l'expédition qu'il m'avoit vu faire; ce qui me confirma qu'il en savoit assez la raison. Cette distinction, au reste, ne dura que jusqu'au port d'Alger, et nous fûmes envoyés au

under the sloped edge of the rules; the whole is held tight by a rule placed at the bottom of the plate and fixed by screws. The form, when thus arranged, is placed upon the carriage of the press.

A plate, of the size of those of the *Virgil*, published in the year 1798, weighs about half a pound, so that the double form, for printing a whole sheet on both sides, weighs 18lbs. The same sheet, formed of types, would weigh about 120lbs. The plates are about the fifth of an inch thick.*—I have inserted, as a specimen of this process, a leaf taken from a book stereotyped and printed by Didot.

Such were the processes practised by MM. Herhan and Didot, at the latter end of the year 1798. Didot has since continued to pursue the same processes, but Herhan soon after separated from Didot, and devoted all his attention to the practice and improvement of his own peculiar processes, specified in his *brevet d'invention* of the 3d of Nivose, in the year 6 (1798); and on the 27th Brumaire, in the year 8 (1800), he obtained from the government a certificate of further additions and improvements to his processes. These processes are described at some length by M. Camus in a paper, inserted in the fifth volume of the *Memoires*

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* Camus, *Hist. de la Stér.* pages 117—123.

de l'Institut National, Litterature et Beaux Arts, pages 277 et seq. The substance of this description will be found contained in the following abstract.

Herhan's object was to form a set of types, or rather separate moveable matrices, each of which, instead of presenting a figure of the letter in relief and in reverse, should bear an impression of it, in right order as when printed, sunk into its end; so that, when the page should be composed with these types, it would become, without any other operation, one complete matrice, with which the plates, in relief and in reverse, could be *struck*, as before described.

The advantages Herhan anticipated from this process were,—

1st. To get rid of the operation of sinking the page, when composed of types in the usual way, into a mass of metal or other substance, in order to form a matrice.

2d. That from the hollow-faced types, or matrices, formed separately, a more perfect mould would be obtained, than by the above method.

3d. The possibility of employing a harder metal than lead, and one more capable of forming a perfect mould.

Herhan at first attempted to form these hollow-faced types by casting them, with a harder alloy than type-metal, in a type-founder's common mould, in the bottom of which he adjusted a punch instead of a matrice. By this means he obtained types, the faces of which were indeed hollow, but they were unavoidably liable to imperfections resulting from the defects in the mould. They were also subject to air-holes, and very often the letter did not appear at all; but the principal defect, to which they were liable, was, that owing to the punch not exactly fitting the mould, there remained a rough edge round the letter, which it was difficult to cut away.

The only method there appeared of surmounting all these difficulties, was to strike as many true matrices, as there were types wanting to compose a page, all exactly of the same height, and fitted for composing with in every respect the same as common types. This Herhan accomplished by means of a machine, invented by him for facilitating the correction of errors in the stereotype plates,—the method, before described, of removing the faulty letter with the graver, having been found tedious, and it having been found also extremely difficult to remove it, and to give to the aperture the exact size of the type to be introduced, without injuring the adjoining letters.

Upon a copper table Herhan raised two copper uprights, united at the top by two cross-pieces *(traverse-double)*; between these uprights slid an apparatus, armed with the instrument for removing the letter. Beneath the cross-pieces, and between the cheeks, or uprights, was a carriage, bearing the plate to be corrected, and having beneath it a vacant space corresponding with the letter to be removed. The plate having been placed upon this carriage, and the line, in which the correction was to be made, being brought beneath the cross-pieces, the removing instrument was brought down upon the faulty letter; it was then struck with a hammer, and by this means the letter was cut out. Another letter was then inserted, as before described. This machine was afterwards used both by Herhan and Didot.

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Herhan applied this machine to the striking of his types. In place of the instrument, which removed the letter, he substituted a punch, and fixing his shank of metal perfectly upright upon the carriage, and exactly beneath the punch, he brought the latter perpendicularly down upon it, and by a slight blow with a hammer struck the punch into the end of the shank of metal, and thus formed a hollow-faced type. By a shoulder, or check, the punches were prevented from sinking beyond a given depth; and thus all the impressions were made perfectly equal in this respect,—a point of the first importance, as otherwise, when the stereotype plate came to be *struck*, the letters in it would be of unequal heights, which would render it totally unfit for printing with.

Having thus acquired the means of striking the matrices with facility, Herhan's next objects were, to discover a metal to form the shanks of his types, and a mode of preparing them to receive the impression. He at first made use of lead alloyed with different metals, trying to combine hardness with economy. With alloys of this description he cast the shanks of his matrices in the common type-founder's mould, and then struck them with the punch. He made some attempts in this manner, but soon abandoned it, and adopted the plan of forming the shanks of copper. This method M. Camus characterises as the point of perfection in stereotype printing.

The first specimen of his process, which Herhan produced, was six lines printed from a stereotype plate, formed from moveable copper matrices. His next production was four lines, laid before the National Institute in 1801. In the following year he produced a whole page, and in the same year, he informed Camus, by letter, that he had struck 40,000 matrices of the lower case letters, and was about to strike the capitals, which he was in hopes of accomplishing with equal success. In the latter part of the same year, he exhibited at the Louvre an edition of *Sallust*, in 12mo. and a very beautiful inscription on the art of printing and stereotype, on a large folio page, filled with capital letters of various sizes, and printed from two stereotype plates joined together. The plates of all these were formed from copper matrices; and as a reward for his ingenious performance, a gold medal was voted him by the government. From this time he went on improving his establishment, in which, when Camus visited it in 1804, he employed a considerable number of workmen. M. Camus gives the following account of the manner in which the hollow-faced types were at that time formed.

From plates of rose copper were cut a number of rods, which, after being tempered to such a degree of softness as to render them capable of receiving the impression of the punch readily, without occasioning any resistance to the punch, and thereby injuring it, were drawn by two machines into a perfectly square form,—the last machine producing them of the proper degree of thickness, suited to the body and size of the letter, for which they were intended. The rods were then cut into small pieces of equal length, which were justified on all sides and *nicked*.* When the copper shanks were thus prepared, a portion of the top, where the impression of the face of the letter was to be made, was planed off, the surrounding part being left of the *original height*. Each piece of copper, being then taken singly, and placed in the vice fixed on the carriage of the apparatus, in which the matrices are struck, received an impression of the punch in the manner already noticed.

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* All types have one or more nicks in their body, to serve as a guide to the compositor when arranging them in his stick.

By planing off part of the copper shank a very slight impression only of the punch was necessary, as the part, which was left of the original height, rendered the letter in the stereotype plate, which might afterwards be formed from these matrices, of a sufficiently prominent relief. By this means and the use of quadrats higher than the face of the letter, the spaces between the lines and all the other parts, which must appear blank, are left in the stereotype plate much lower than the letter. There is thus no fear of any of the blanks in the plate marking, whilst printing,—and consequently no necessity for a machine for cutting down these spaces, as is stated in page 99. Notwithstanding the exactness which pervaded very part of the operation of striking the matrices, Herhan took care to prove them from time to time; this was done by placing in a small apparatus, from which a cast could be taken in the hand, two letters which stood perfectly *in* *line*, and between them the one just struck was put; the letters were then examined to see if they *lined* exactly, and for greater security a cast was taken from them, of which a smoked impression was made.

From what has already been stated, the manner of using these hollow-faced types, or rather matrices, must be so apparent to every one as to scarcely need explanation. As soon as a sufficient quantity of such matrices have been obtained, they are composed into pages, which after being corrected, are inclosed in steel frames, which being attached to the screw of the ram of the stereotyping machine, a stereotype plate is by one operation *struck* from the page with the greatest facility. Though M. Camus does not mention it, I suppose the page of matrices is surrounded with a border of steel, a little higher than them, for the purpose of rendering the plate of the proper size and thickness.

The machines used by Herhan were fitted up with great care and accuracy. The spiral springs, placed beneath the feet, for the purpose of causing a re-action between the table and the ram after its descent, were inclosed in copper boxes; and the body of the ram was made of steel, and slid in two copper collars, cut with the nicety of mathematical instruments. Herhan, however, was not quite satisfied with this operation, as air-holes were too frequent, and from being often hid in the interior of the plate, rendered it liable to bend, or break, with the first pull of the press.*

It will be evident to every one at all conversant with printing, that great inconvenience must arise to the workman in composing with these hollow-faced types; as from their not being in reverse order, they must be set backwards in his stick.—Practice will, no doubt, in a great measure, enable him to overcome this inconvenience. The reading and correcting of pages, composed with these types, will also be attended with difficulty and inconvenience, as before a proof can be obtained, a plate must be *struck* from the page, and an impression taken from this plate. All errors discovered in this proof can be easily corrected in the page of matrices, from which a correct plate can afterwards be *struck*, but the first plate is rendered quite useless. Herhan combats this objection by saying, that the expense of taking a proof plate is too trifling to be worth consideration, and that from practice they can read in his office the matrice pages with such accuracy, and they are so skilful in *striking* plates, as to reduce the expense of proofs to almost nothing.

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* Camus suggests several remedies for these air-holes, but they seem in a great measure inseparable from the operation of *striking;* for as the matrice descends with the face downwards, it is scarcely possible for all the air to be driven out of the face of the letters, and the compressibility of the air must be counteracted by its rarefaction. This, I think, will account for all the air-holes on the surface of the plate; those in its substance are probably partly owing to the evaporation of the moisture, &c. contained in the paper, or paste-board, of which the tray, in which the melted metal is poured, is formed.

It has also been objected to this process, that in striking such a number of matrices, the punch must be liable to break, and when this happens it must be difficult to replace it by one of precisely the same size and form. This, however, Herhan says, very rarely happens, from the care taken in selecting the steel, and in proving them before use; and supposing one to break in the act of striking, it can be easily supplied by a new one of exactly the same form from the matrices already struck.

Such were the processes used by Herhan in the year 1804, and I am not aware that any material alterations or improvements have subsequently been made in them. Herhan was succeeded by MM. Mame, brothers, who have continued to follow his processes with the greatest success. In the year 1810, when M. Lambinet wrote his *Histoire succincte de la Stéréotypie*, 2000 plates were *struck* in their foundry every month; and more than 200 works of different sizes had been stereotyped by

Specimen of M. HERHAN'S *Stereotype.*

CHAPITRE XI.

Le bûcher.

SÉTOC enchanté fit de son esclave son ami intime. Il ne pouvait pas plus se passer de lui qu'avait fait le roi de Babylone; et Zadig fut heureux que Sétoc n'eût point de femme. Il découvrait dans son maître un naturel porté au bien, beaucoup de droiture et de bon sens. Il fut fâché de voir qu'il adorait l'armée céleste, c'est-à-dire, le soleil, la lune et les étoiles, selon l'ancien usage d'Arabie. Il lui en parlait quelquefois avec beaucoup de discrétion. Enfin il lui dit que c'étaient des corps comme les autres, qui ne méritaient pas plus son hommage qu'un arbre, ou un rocher. Mais, disait Sétoc, ce sont des êtres éternels dont nous tirons tous nos avantages; ils animent la nature, ils règlent les saisons; ils sont d'ailleurs si loin de nous qu'on ne peut pas s'empêcher de les révérer. Vous recevez plus d'avantages, répondit Zadig, des eaux de la mer Rouge qui porte vos marchandises aux Indes. Pourquoi ne serait-elle pas aussi ancienne que les étoiles? Et si vous adorez ce qui est éloigné de vous, vous devez adorer la terre des Gangarides qui est aux extrémités du monde. Non, disait Sétoc, les étoiles sont trop brillantes pour que je ne les adore pas. Le soir venu, Zadig alluma un grand nombre de flambeaux dans la tente où il devait souper avec Sétoc; et dès que son patron parut, il se jeta à genoux devant ces cires allumées, et leur dit: Eternelles et brillantes clartés, soyezmoi toujours propices. Ayant proféré ces paroles, il se mit à table sans regarder Sétoc. Que faites-vous donc? lui dit Sétoc étonné. Je fais comme vous, répondit Zadig; j'adore ces chandelles, et je néglige leur maître et le mien. Sétoc comprit le sens profond de cet apologue. La sagesse de son esclave entra dans son âme, il ne prodigua plus son encens aux créatures, et adora l'Etre éternel qui les a faites.

Il y avait alors dans l'Arabie une coutume affreuse venue originairement de Scythie, et qui, s'étant établie dans les Indes par le crédit des brachmanes, menaçait d'envahir tout l'Orient. Lorsqu'un homme marié était mort, et que sa femme bien aimée voulait être sainte, elle se brûlait en public sur le corps de son mari. C'était une fête solennelle, qui s'appelait *le bûcher du veuvage.* La tribu dans laquelle il y avait eu le plus de femmes brulées était la plus considérée. Un Arabe de la tribu de Sétoc étant mort, sa veuve, nommée Almona, qui était fort dévote, fit savoir le jour et l'heure où elle se jetterait dans le feu au son des tambours et des trompettes. Zadig remontra à Sétoc combien cette horrible coutume était contraire au bien du genre humain; qu'on laissait brûler tous les jours de jeunes veuves qui pouvaient donner des enfants à l'Etat, ou du moins élever les leurs; et il le fit convenir qu'il fallait, si on pouvait, abolir un usage si barbare. Sétoc répondit : il y a plus de mille ans que les femmes sont en possession de se brûler. Qui de nous osera changer une loi que le temps a consacrée? Y a-t-il rien de plus respectable qu'un ancien abus? La raison est plus ancienne, reprit Zadig. Parlez aux chefs des tribus, et je vais trouver la jeune veuve.

them. Amongst these the *Corps du Droit Français* and the *Dictionnaire de l'Academie Française*, both in royal 4to. are particularly deserving of attention. Indeed the whole of the works, which have issued from this establishment, are remarkable for their clearness of impression and neatness of execution, and must rank in the very first class of stereotype-printed books; as will, I think, be fully proved by the specimen here inserted.

Nearly contemporary with the first essays of Herhan, were those of Boudier, one of the artists who had been employed in the fabrication of the assignats. In the latter end of the year 1798, he produced some specimens of stereotype printing, by a process totally different from those of either Herhan, or Didot. Amongst these specimens was a quarto page, entitled, *Declaration des Droits et des Devoirs de l'Homme et du Citoyen ;* a report respecting this page was made to the Government on the 20th of Fructidor, in the year 6. From this period Boudier continued his operations, and on the 7th of Frimaire, in the year 9 (1801), obtained a patent securing to him the property of his invention. In the following year he published several school books, which he sold much cheaper than the usual editions; one of the principal of these was the

Grammaire Française simplifiée par Castille; a second edition of which appeared in 1803, in 12mo. and is truly stated to be printed from plates *monotypées en bronze par Boudier.* But Boudier seems to have been chiefly occupied in casting stereotype plates for the printing of music; and had also previously applied the art to the making of *filligranes*, for the use of paper-makers, such as the marks of the quality of the paper and its uses, the maker's name, &c.

M. Camus was unacquainted with the precise nature of the process followed by Boudier, but he had ascertained that the mould was taken from the page of types by sinking its face into a mass of soft clay. Into this clay matrice melted copper was afterwards poured, in much greater quantity than was requisite to form a plate, as it was upon the weight of metal that he depended for its entering completely into all the cavities and angles of the mould. When cold, the plate was reduced in a lathe to such thickness as was required.* An impression from the plate of the *Declaration* above mentioned is inserted in Camus's *Hist. de la Stéréotypie*, but it does not convey any very favourable idea of the merits of this process.

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* Camus, *Hist. de la Stér.* and *Memoires de l'Institut National, Litt. et Beaux Arts*, tom. v.

Before concluding the account of the several projects, relating to the art of stereotype printing, which had their origin in France, before the year 1800, it remains to state, that, according to M. Camus's account, the engravers on wood in Paris were, for some time before the close of the century, in the practice of selling copies in metal of their vignettes, tail-pieces, &c. They made a great secret of the method by which these copies were taken, but there can be no doubt that it was much the same as those already stated to have been practised in Germany about 1740 (*see page* 38). Camus supposed, that a mould was taken from the woodcut with plaster or clay; and as such a mould would not be sufficiently strong to undergo the operation of *striking*, the melted metal must therefore have been poured into it. The great difficulty of such an operation would consist in causing the metal to penetrate into all the cavities and lines of the mould. The readiest means of obviating this difficulty would be to press the metal into the mould, at the precise moment of its growing fixed, as strongly as the nature of the mould would permit, either by submitting it to the action of a press, or loading it with a considerable weight. Camus did not consider this practice to have been long in use in France, as no mention is made of it by Papillon in his *Traité de la*

Gravure en Bois. Bertrand Quinquet, in his *Traité de l'Imprimerie*, published in 1799, describes a method of stereotyping wood cuts, by taking a mould from them with German spar, and pouring melted metal into it to the depth of a quarter of an inch or more.—He adds, that he had followed that method for some time; but, as Camus well observes, if his process comprised nothing more than what he has described, he would not obtain perfect copies.

The latter years of the last century were so fertile in projects of different methods of stereotype printing, that feeling it impossible to preserve a strictly chronological order in the enumeration of them, and at the same time give such a connected view of the progress and improvement of each, as can alone render an account of them interesting or satisfactory, I have thought it best to preserve unbroken the narrative of such projects of the different French artists as had their origin before the year 1800, though by so doing, I have unavoidably been obliged to postpone the notice of other schemes, which, towards the latter end of the century, were projected and carried into practice in other countries. To these schemes I now revert.

Amongst the first of these in point of time, was that, which, as we learn from the *General Literary*

Gazette of Jena,* was conceived at Vienna, about or prior to 1798, by Samuel Falka, a native of Hungary. Of his proceedings and the nature of his processes, little or nothing is known, for his progress was speedily checked by a remarkable occurrence. The great similarity, existing between his projects and those of Didot, caused him to be suspected of maintaining a correspondence with France. A commissary of police, in consequence, paid him a domiciliary visit, and he was obliged to prove himself innocent of the crime, of which he was suspected. Having cleared himself from this accusation, he endeavoured to obtain from the Court of Vienna a privilege for printing stereotype editions; but this privilege was refused him. Falka was not, however, discouraged; for having soon after been admitted as a letter-cutter into the printing office of the University of Buda, he there found an opportunity of making use of his discoveries, and has since laid several specimens of his performance before the public.†

After a long interval the course of this inquiry is again directed to our own country, and though the first experiment, I am called upon to notice, may be more ingenious than useful, it would not be proper to pass it over unnoticed in a work of this nature. About the latter end of 1797, Professor Wilson, of Glasgow, who had been engaged in a series of experiments to apply etching on glass by means of the fluoric acid to the purposes of art, but who was dissatisfied with the result, as even the best impressions taken from such etchings were very paltry, thought it might be possible to obtain from an engraved copper-plate any number of polytype plates of glass. Having communicated his ideas on the subject to Mr. Tassie, of London, and having sent him some engraved copper-plates to operate upon, that ingenious artist succeeded, by means of a mould (formed of plaster of Paris and tripoli), taken from the copper plate, in obtaining in his furnace polytype plates of glass and enamel, equally capable of producing a fine impression as the original copper-plates. The Professor thought, that such plates might be adopted with the best effects for the prevention of forgery in the printing of bank-notes, as "from a series of glass plates, inconsiderable in point of number, deriving the engraving from the same original pattern, to succeed one another at the press, just before signs of wearing might appear, a vast many impressions, all perfectly similar, might be obtained even for ages." The objection that

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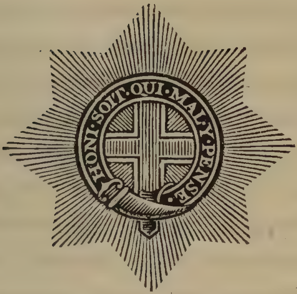
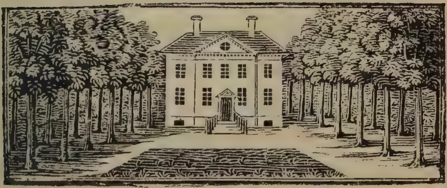
* Correspondence of the 7th of February, 1801, col. 183.

† Camus, *Hist. de la Stér.* page 132.

Specimens of Professor Wilson's *Glass Plates made from Wood Engravings.*





plates of glass would be too fragile to resist the press, he combats by stating, that he had found by experience, that by "joining the backs of glass plates to pieces of iron or steel of considerable thickness by an intervening lamina of proper cement, taking care that it affords a very complete contact," and by "aiding them further with a very simple apparatus upon the press-board," glass plates might be safely passed through the rolling press.*

Mr. Tassie also, by similar means, obtained from wood cuts engraved by Mr. Bewick, and which had been sent him by Professor Wilson, "casts or copies in glass, as perfect as the originals."†

By the kindness of Messrs. Wilson, type founders, of Glasgow, I am enabled to lay before the reader impressions taken from some of these glass plates made from wood engravings.

In the year 1800, the late Earl of Stanhope, to whom the art of printing is indebted for that most useful and efficient press which bears his name, became desirous of introducing stereotype printing into this country, where, though it had been already twice invented and practised, it had for some years fallen into disuse, and might indeed be said to be almost unknown. Every information respecting his process was liberally communicated to his Lordship by Mr. Tilloch; and his Lordship was also further assisted by the personal instructions of Mr. Foulis, who, during a residence of some months at his Lordship's residence at Chevening, initiated him in the practical part of their process. Thus instructed, and aided by the exertions of Mr. Andrew Wilson, a respectable printer, in London, his Lordship entered into a series of experiments for the purpose of bringing the art to perfection; and at length, after two year's application, succeeded, in 1802, in the attainment of his object, by the completion of the process, which now bears his name, and is generally adopted by the stereotype printers in England.* Mr. Wilson announced the result of his Lordship's experiments, in glowing terms; and in 1803, under his immediate patronage, commenced his operations as a stereotype printer, by the publication of *Frelynhausen on the Christian Religion*, a work which had long been a favourite with her late Majesty, and was translated from the

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* Nicholson's *Journal*, vol. ii., 4to. page 60.

† Ibid. page 63.

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* It having, soon after the commencement of his Lordship's experiments, been attempted to represent Earl Stanhope as the original inventor of stereotype printing in England. Mr. Tilloch published the statement which has already been quoted, in order to shew the fallacious nature of such representations.

German, by her command; this translation was revised by Bishop Porteous.

Mr. Wilson continued his labours for some time, but not receiving that encouragement from the London Booksellers which he had expected, he endeavoured to establish himself as a stereotype bookseller. He, accordingly, published stereotype editions of several standard school books, but his success has not, I fear, been equal to his wishes. As a stereotype printer, Mr. Wilson must ever rank amongst the most eminent; the plates, which were cast by him, having never been excelled, if ever equalled. His best performance, and which at the same time is a most favourable specimen of this mode of stereotyping, on account of the fidelity with which such a mass of minute letters is rendered, is probably the octavo edition of *Walker's Pronouncing Dictionary*, published in 1809; though the octavo edition of *Johnson's Dictionary* is, perhaps, a more handsome book.

In 1803, the process was, for a valuable consideration, communicated to the University of Cambridge, and in a year or two after to that of Oxford; but it was probably 1807, before any works appeared from the former, and 1809, from the latter. With these exceptions, the knowledge of the art was confined to Mr. Wilson and those in the confidence of Lord Stanhope and himself. It was endeavoured to be kept most inviolably secret, and for some years the endeavours to this end were successful; but in consequence of some misunderstanding between Lord Stanhope and Mr. Wilson, Mr. Walker, the original maker of his Lordship's presses, and the person, who fitted up Mr. Wilson's foundry, was encouraged by his Lordship to set up a stereotype printing office, in opposition to Mr. Wilson; and being unskilled himself in the practical part of the process, he was secretly instructed on this point by one of Mr. Wilson's workmen, originally recommended to Mr. Wilson by Lord Stanhope. These proceedings of Walker, as might be expected, produced a rupture between him and Mr. Wilson, who afterwards employed Mr. Peter Kier, an eminent engineer, as the maker of his apparatus.—Kier made several important improvements in it; but a quarrel having also in a short time arisen between Mr. Wilson and him, he, in revenge, taught any person, who applied to him, the whole of the process for £50. provided they gave him an order for the apparatus, for which he charged £250. more. The nature of the process thus became known; and many having availed themselves of this opportunity, there are now in London at least twelve establishments for the casting of stereotype plates.

This process may be described nearly as follows: but it must be premised, that its success depends upon a number of minute details which can only be learnt by practice.

The types, with which the pages are composed, are the same in every respect, as those in ordinary use, excepting that the shoulders, instead of being dressed off, are left square, as they come out of the mould. The spaces are also higher than usual, being equal in height to the shoulder of the types; the quadrats and leads are nearly as high as the spaces. As soon as a page is composed, it is imposed in a small chase, care being taken to surround it closely with pieces of brass or type-metal reglet, about the eighth of an inch thick, and equal in height to the quadrats. After a proof has been taken, and the page has been properly corrected, it is carried in its chase, and laid upon the moulding table, which is generally a polished and perfectly level plate of cast iron, about two feet long and fifteen inches broad. It is then *planed*, and care taken, that none of the spaces or quadrats are standing up. A frame of brass or bell-metal, about half an inch deep, is afterwards placed over it, so that the face of the page appears within the opening of the frame. Upon the depth or thickness of the frame depends the strength of the mould. The frame is raised upon four pins, or legs,* screwed into its under surface, and which passing, partly on the outside, and partly on the inside of the chase, rest upon the table, and so support the frame quite level. The sides of the opening in the frame are not perpendicular, but sloped, or beveled off, from the under to the upper side, at a considerable angle; this slope, however, does not rise from the extreme inner edge, but between this and the commencement of the slope there occurs a small flat ledge.—The inner edge of this ledge fits closely round the brass reglet surrounding the page; and the legs, upon which the frame rests, should be of such a height, as to allow the ledge to sink a little below the upper surface of the brass reglet.—Upon the height of the legs, and the consequent sinking of the ledge below the reglet, depends the thickness of the future plate. The use of the brass reglet is to form an edge all round the plate, below the shoulder of the letter, to allow of its being fastened to the blocks of wood upon which it is raised, when used for printing with.

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* The frame used originally to rest upon the chase, but this rendered it necessary that the chase and the frame should be both accurately adjusted.

When the page is thus disposed, the face of it and the inside of the frame are lightly oiled; it is then ready to receive the plaster of Paris, destined to form the mould. This must have previously been well baked, beat small, and finely sifted; but as this is a troublesome operation, it is generally bought ready prepared for use. A sufficient quantity of plaster is then carefully mixed in a proper vessel with water, to about the consistency of syrup; and a portion of this, sufficient to cover its face, is poured upon the page. This is then well worked for a short time with a small brush, in order to force it into the face of the types; and the remainder of the plaster is afterwards poured on, so as to fill all the opening in the frame. At the moment of its becoming fixed, a brass rule is slid over the frame, and by this means all the superfluous and uneven parts of the plaster are struck off, and the back of the mould rendered smooth and level.—When the mould has acquired the proper degree of firmness, it is removed from the page, by gently raising the frame from the chase. It requires considerable skill to be able to catch the precise moment of doing so; as should it be attempted too soon, the mould would be apt to break, or to be altered in its shape; and if too late, the *kerned** types could not be separated from the mould without injury. When the frame and mould are separated from the page, they are set aside for a short time to dry; and the mould, being separated from the frame, is carried to the drying oven, which contains a semi-circular rack, divided into numerous compartments, in one of which the mould is placed. Here it is baked, at the usual heat of ovens, until it assumes a slight brown colour, which is generally in about 3 or 4 hours.

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* A type is termed *kerned*, when part of its face projects over

When the mould is taken from the oven, a small nick, called a *gate*, is cut at each of its four corners, to admit the melted metal, and it is then placed in the casting pan. This is an oblong square vessel of cast iron, about four inches deep; the sides of which slope outwards at a small angle. On the bottom of the pan rests a plate of iron, the upper surface of which is turned smooth and level, and the four corners rather rounded off to allow the melted metal to flow under it, to facilitate which there are also cut some grooves on its under side: upon this plate is placed the mould with its face downwards. Both the pan and the plate must have been previously heated in an oven to about the same degree of heat as the metal. The pan is covered

the sides of its body; such are the Roman f and j, and many of the Italic letters.

with a flat iron lid, the corners of which are rounded off to admit the metal, and the pan is taken hold of by a pair of small clamps, the ends of which fix into cavities purposely made at its opposite sides. A long screw, in the centre of the clamps, acting upon a knob upon the cover of the pan, at the same time that it causes the clamps to take fast hold of the pan, keeps the cover firmly fixed in its place. The pan is then raised by a small crane, and lowered into a plumber's melting pot, containing about three or four hundred weight of melted type-metal. It is lowered so far as to allow a small quantity of the metal to flow into the pan, through the openings left at each corner of the lid; it is then raised, and kept for some time half immersed in the metal, to allow the pan and mould to acquire the proper heat, and to effect the expulsion of the air out of the face of the mould. When this is thought to be effected, the pan is sunk lower, and the metal allowed to flow gently into it, till it is full; were it to rush in too quickly the mould would probably be broken. It is then sunk to the bottom of the melting pot, where it is allowed to remain about ten minutes. By this operation, the plate, lying on the bottom of the pan, is raised by the greater specific gravity of the melted metal, and pressing upwards against the mould, not only forces the metal into its face, but forms the stereotype plate, by cutting off the metal, contained within the cavity of the mould, from the surrounding metal, and by rendering the back of the plate as smooth and level as its own surface.—The casting is by far the most difficult part of the process, and requires the greatest skill to execute well; many, who have even received instructions in the art, never having been able to obtain a single perfect plate. The most essential points to insure success appear to be,—not to immerse the pan and its contents too suddenly,—and not to do so until they have acquired the same degree of heat as the melted metal, and until all the air has been expelled. But the placing of the mould with its face downwards must always prove a radical defect in this process; as it seems almost impossible, that so situated, the air can ever be completely driven out of the face of the mould.

When the pan has lain a sufficient time in the pot, it is raised out of it, and swung round by the crane over the cooler, which is a long shallow vessel, containing a small quantity of water, and some loose bricks, nearly immersed in the water. Upon one of these bricks the pan is set, and it is there left to cool. When it has cooled sufficiently, it is laid upon a block of wood, and the clamps unscrewed; the cover is removed, and the contents of the pan, which then present the appearance of a solid mass of type-metal, are turned out upon the block.—The workman then takes a wooden mallet, and with repeated hard blows strikes off the corners and edges of the upper side of this mass of metal.—When these are removed, the stereotype plate will be found lying near the top, between the mould and floating plate. As much of the mould, which is always destroyed by the process, as can be removed with the hand, is then separated from it, and the plate is soaked in water to soften the remainder, from which it is afterwards cleaned by picking, brushing, &c. The plate is then examined, to ascertain if it will answer, in which case the page, from which the mould was taken, is returned to the compositor; if it will not, another mould is taken from it, and the operation repeated.

When a good plate has been obtained, the roughness of the edges is removed with a plane, and the plate reduced to the proper size. A proof is next taken from it, and the several imperfections of the casting marked upon the margin. The plate is then delivered to the picker, who, with his picking instrument (generally a fragment of a fine goldsmith's *broach*, sharpened to a point, in the manner of a graver), opens out such letters as require it, or will admit of it, and clears away all superfluous pieces of metal. When a letter is so imperfect, as not to be capable of being repaired with his picker, he strikes it out with a punch of the same size as the letter, or cuts it out with a graver; and turning the plate with its face upon the table, introduces a type of the proper kind into the opening made by the punch. He thrusts it down till it touches the table, and then saws off the portion of the shank of the type standing above the back of the plate; rubbing the place over, with any of his tools will sufficiently fix the introduced type. In this manner a whole word, or more, may be removed, and others inserted; but when the insertion is large, it must be soldered in. The picker also, with a square pointed graver, cuts down all the white lines, which would be in danger of marking when printing.

When used, the plates are raised upon blocks of wood or brass, furnished at the sides with small ledges, which overlap the edges of the plate, and being fastened down with screws hold the plate firmly fixed to the block. These blocks are imposed in a chase with furniture, regulated to suit the margin, in the same manner as ordinary pages. After being used, they are washed with ley, to clean them from the ink, and wrapped in a sheet of paper; they are generally laid by in a small box, divided in the middle by a partition, on one side of which are put the plates forming the inner form of the sheet, and on the other those of the outer form.

In the same year that Lord Stanhope commenced his experiments, Citizen Poteral announced to the Class of the Mathematical and Physical Sciences of the National Institute of France, that he had invented a more simple method of stereotyping than any yet in use. Monge and Desmarets were commissioned by the Class to examine his processes, and make a report of the result of their investigation. From the report, which they made on this occasion, it appears, that Poteral had executed nothing according to his projected plan, which was in fact merely a modification of part of Herhan's method. Poteral proposed to form matrices for casting hollow-faced types, instead of types in relief; to compose the pages with these types; and then to cast from them a stereotype plate, formed of a compound metal. This plan appeared to the commissioners to be liable to so many objections, that they gave no favourable report of it, and indeed Poteral himself was far from sanguine of its success.*

In the year 1803, a person named Pierre Pellier de Joyeuze proposed a new method of stereotyping, which Camus describes as consisting of taking a mould with clay from a page composed of moveable types in relief. His process was cheap; and Camus says, that the specimen he had seen of his performance was tolerable, but had all the defects of plates cast in clay.*

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* *Memoires de l'Inst. Nat. Litt. et Beaux Arts*, tom. v.

In a report, read before the *Société d'Encouragement*, on the 12th of February, 1806, M. Darcet, the son of the celebrated chemist, proposed the extension of the art of obtaining metallic impressions by *striking* with moulds of plaster to several arts, and particularly to those connected with the art of design. The uses, to which he proposed to apply it, were,—the making of blocks for the manufacture of paper hangings and printed goods,—ornaments for furniture, which may serve as substitutes for carving,—moulds for artificial flowers, and figuring of stuffs,—imitations of ancient coins and gems,—and lastly, imitations of wood engravings. The last is, perhaps, the only one of these objects which falls strictly within the range of my present enquiry, but as there could be no doubt from the previous operations of others, that imitations of wood engravings could be obtained by the operation of *striking*, M. Darcet's project is only remarkable as proposing to effect this by moulds of plaster, which are generally considered as too fragile to undergo such an operation. To strengthen the moulds he steeped them in a weak solution of glue, nearly boiling hot, till all the air was expelled; they were then taken out, and dried slowly. The metal he proposed to employ was the fusible alloy discovered by his father.*

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* *Memoires de l'Inst. Nat. Litt. et Beaux Arts*, tom. v. page 562.

About the time of which we are now treating, some of the processes for polytyping, already described, were united by some artists in America to

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* M. Darcet gives the following instructions for the preparation of this alloy:—The compound should be formed of 8 parts of bismuth, 5 of lead, and 3 of tin. Fuse the bismuth, cover it with resin or suet, and heat the whole rather strongly; add the lead, stir them well together, increase the temperature a little, and add to the metals in fusion the requisite quantity of tin.—Stir the mixture again, and cast it into a plate or ingot. When it is well made, it begins to soften at 196° of Fraht. and melts at 199°. It is only to be used in the soft state; as it cools, a crystallization forms in the still fluid mass of metal, and this crystallization must be broken by stirring, and by bringing the part near the edges to the centre, and *vice versa*. When the whole is reduced to this state, nothing more is required than to stamp it quickly with the plaster matrice.

The solution of glue is formed by dissolving 3½ ounces in 4 pints of water; after the solution is made, it must be strained powerful mechanical combinations, for the purpose of producing, with facility and dispatch, a number of polytyped plates, each perfect fac-similes of an elaborately engraved original; with the view of rendering the forgery of bank notes as difficult as possible, if not altogether impracticable. In the American bank notes, the vignette, words, and writing, usual in such notes, are surrounded by a curiously engraved border. This border was engraved upon thick plates of soft steel, the circular work being put in by the lathe, and the flowers and other ornaments by punches, and the methods commonly practised by die engravers. After the pattern was completed, the plates were hardened.—The plates were then employed to impress a reverse on rollers of very soft cast steel, by repeatedly passing the plate between the rollers. The rollers were then hardened, and from these the impression was transferred to plates of copper, on which the writing and vignette were afterwards engraved in the

through a piece of fine linen. It is then heated till near boiling, and the moulds, previously dried and heated, are immersed in it. When taken out, the mould must be shaken, and its engraved surface strongly blown upon, that pellicles of glue may not be formed in cooling.—Those who wish for more minute details, may consult the *Bulletin de la Société d'Encouragement*, No. 20, February, 1806, and Nicholson's *Journal of Natural Philosophy*, &c. vol. xiv. 8vo. page 191.

usual way.* Notwithstanding, however, the security, which this method appears to afford against forgery, some of the American bank notes for large sums have been forged, and a regular establishment for counterfeiting them was, we are told in the Report named in the note, formed in Canada, during the late war.

In the year 1809, Mr. Charles Brightly, Printer, of Bungay, in Suffolk, published a small pamphlet,† giving a detailed account of the method pursued by him in founding stereotype plates. It does not appear from this work, in what year Mr. Brightly first directed his attention to this art; but as he seems to have then attained considerable proficiency in it, and to have practised it to some extent, it is probable that his experiments commenced some years before the date of publication, which is that of June, 1809. The process described in this book bears a considerable resemblance to that adopted by the late Earl of Stanhope. The following is a concise account of it.

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* *Report of the Committee of the Society of Arts, &c. on preventing the Forgery of Bank Notes*, page 70.

† *The Method of Founding Stereotype, as practised by Charles Brightly, of Bungay, Suffolk. Bungay: Printed by C. Brightly, for R. Phillips, Bridge Street, London*, 1809, 8vo. From this pamphlet the subjoined account of this process is abstracted; those, who wish for more minute details, are referred to the work itself.

The types, as in Lord Stanhope's process, should be left with the shoulder undressed off, and ought to be provided with spaces and leads as high as the shoulder of the types; the quadrats ought to be somewhat lower. When the page is composed, it is imposed in a small chase with furniture, nearly four-fifths the height of the letter, and cut to such lengths as to leave an opening at each corner, large enough to admit a *quotation*.* After the last proof is taken, the page is carefully washed to clear it from ink and dirt, and taken to the moulding table, which is composed of a piece of marble, placed perfectly level, about 18 inches wide, and long enough to contain ten or a dozen small chases. Upon this table the page is laid, and care being taken, that none of the furniture, spaces, or quadrats, are standing up, the letter is *planed* down to an even surface. The face of the page is then lightly oiled, and four cubic pieces of metal, exactly four-fifths of the height of the types, are placed in the openings left at each corner of the furniture; upon these pieces of metal depends the thickness of the future plate. A frame of cast iron, nearly half an inch wider and longer than the page, and near an inch deep, is placed over it; this frame rests upon the cubic pieces of metal. The inner side of the frame slopes upwards from the page. When thus disposed, the page is ready for receiving the plaster, of which the mould is to be formed.

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* A square piece of metal, technically so called.

To counteract the liability of the plaster to warp and crack, when exposed to heat, to render it less absorbent of water, and also to facilitate the expulsion of the air and moisture from it, Mr. Brightly mixes it with a small quantity of common whitening. This is effected by mixing whitening with the water, to the consistency of what is generally used in white-washing; and having taken some of this into a wooden bowl, adding as much prepared plaster* to it as will make it into a thin paste. It is now to be stirred quickly with a large iron spoon, till reduced to an equal consistency; and then applied to the face of the letter with a painter's brush, so as to fill every cavity, and the remainder poured on to fill the frame. When the plaster begins to harden, the superfluous part must be struck off, down to the frame, with a straight metal rule; the back of the mould is thus made smooth and regular. The mould is removed, when sufficiently hard, by placing the rule under one side of the frame, and the hand on the other, and gently raising it up. When the mould has become hard, it is placed within the rack in the drying oven. This is an oven four or five feet long, eleven inches high, and sixteen inches broad, divided by upright pieces of sheet iron into spaces capable of holding a mould and its frame; the bottom and sides are made about an inch thick, in order to stand the action of the fire, and the front is closed by two folding doors. When the mould and the frame are placed within the oven, the fire must be continued for two or three hours, sufficiently strong to make the bottom of the oven begin to appear red; but the doors must not be entirely closed, till the evaporation has ceased.—After this the fire is to be replenished, the oven doors are to be closed, and the moulds left in till the morning, when they will be sufficiently prepared to receive the metal.

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* Mr. Brightly does not approve of purchasing ready-prepared plaster, but recommends every person to prepare his own, according to the following method:—

"Provide a pan of thin sheet iron of the length and breadth of the oven, and about five or six inches deep. Break the plaster into small pieces, sufficient to fill the pan; and after the process of casting for the day be over, inclose it in the oven, and keep up the fire, about an hour afterwards. The oven doors should not be quite closed, till the evaporation has subsided; then the fire may be permitted to burn out, and the plaster to remain till morning. It is then to be laid upon a stone or bench and pounded very fine, so as to pass through a lawn, or fine wire sieve."—*Method of Founding Stereotype, page* 23.

When the mould and frame are taken from the drying oven, they are laid, with the face of the mould upwards, in cast iron pans, about three-eighths of an inch thick, two inches deep, and sufficiently large to contain the frame. The sides of the pan are not perpendicular, but wider at top than at bottom, in order that the metal, when cold, may be easily turned out; and a moveable screw is placed at each corner, to furnish a press upon the frame, and so prevent it from rising up. A perforated piece of sheet iron should be placed upon the mould, to prevent its being injured by the metal, when poured upon it. In this state the pans are carried to the casting oven, which is of similar dimensions to the drying oven, but without the rack, and are placed on bars or grating. "The oven may be thus filled; and if an iron stage be made, a second tier of moulds may stand above them." The oven must now be heated till the bottom be nearly red, and the moulds should remain in it from one to two hours, according to circumstances. A quantity of melted type-metal,* from the melting pot, is then poured into each pan, so as to cover and enclose the moulds. "After which it may stand four or five minutes longer, to allow the metal and moulds to acquire an equal degree of heat, for on the single principle of equal temperature between the metal and moulds, the whole success depends." The pans are then taken out in succession from the oven, with an iron spade, and placed on grated shelves within a recess above the melting pot, into which any superfluous metal will fall. The perforated plate must now be removed; and the metal being skimmed, a smooth and truly level plate of iron, about half an inch thick, must be laid upon it. If this plate be sufficiently loaded, it will sink to the frame containing the mould, and the back of the stereotype plate will thus receive an even surface. This plate should also have been previously heated to the same temperature as the metal, otherwise the back of the plate will be full of holes and other defects. In this state it is left to cool; and when this is effected the contents of the pan are turned out. The iron plate is then removed, the superfluous

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* The metal, intended for stereotype plates, need not be so hard as that used for types. Mr. Brightly prepares his metal thus:—To five or eight hundred weight of hard lead, according as the metal is intended to be for hardness, melted in a large pot over a slow fire, and skimmed clean, he adds one hundred

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weight of good regulus of antimony, broken into small pieces, and separated from all dirt and dust. The metal must be kept stirred, till the whole is melted. When it is all melted, take it out of the pot with an iron ladle, and put it into iron pans to cool. *Method of Founding Stereotype*, page 20.

metal broken off, and the mould, containing the plate, forced out of the frame. The principal part of the plaster being separated from the plate, it is laid in water to loosen that which still adheres to its surface. The remaining part is then cleared off with a brush, and if the process has been properly conducted, a complete plate now presents itself.—After a little practice, a careful workman will not spoil one plate in twenty. The plate is now delivered to the picker, who examines it carefully and repairs its defects in the manner already noticed in the description of Lord Stanhope's process.

When the plate is used, it is laid on wooden blocks, and fastened down with a slip of brass and a screw. When the plate has, from any defect in the apparatus, been cast of such unequal thickness, that its face does not lie horizontal, when resting on the block, Mr. Brightly solders to its back four or five pieces of split lead, with their ends a little curved. He then lays the plate with its face downwards on a smooth horizontal piece of marble, and locks "it up gently in a chase, so that four straight pieces of iron, the exact height of moveable types, may surround it in a hollow square, corresponding with the size of the page." He then pours in a quantity of Roman cement (manufactured by Messrs. Parker, and Co., Bankside, London,) to fill the frame, with which it is struck off correctly level; the plate and cement thus form together a solid page, which may be imposed and used in the usual way. Mr. Brightly seems to prefer this, as a general method, to mounting the plates on blocks of wood, when used.

When the pages are returned from the foundry, they require to be cleaned from the oil and dirt, which adhere to them, and for this purpose they ought to be put into an oblong boiler, with a partition in the middle, each end of which must be large enough to contain three or four chases. These may be boiled at one end, and with the water and a soft brush at the other, the letter may be thoroughly cleaned.

Whether this process was ever practised by any person besides the inventor, it is out of my power to inform the reader; it seems well deserving of adoption, or at least of trial, as from the greater simplicity of its arrangements, and particularly from the face of the mould being laid upwards during the operation of casting, the difficulty of obtaining perfect plates by this process is probably not so great as in that invented by Lord Stanhope.

About the year 1818, Mr. Applegarth, Printer, of Nelson Square, Great Surrey Street, London, who had hitherto followed Lord Stanhope's process, directed his attention to the *striking* of stereotype plates with a metallic matrice, or mould, in the manner of the French stereotype founders. In this he was so successful, that on the 23d of April, 1818, he took out a patent for his invention. A copy of his specification, with a plate descriptive of his apparatus, is inserted in the *Repertory of Arts, &c.* for the month of January, 1820;* from this work, the following account of his process is taken.

The letters or types, or metallic blocks or ornaments, from which the matrice is to be made, are composed, or set up, into a page in the ordinary manner, observing to use the high spaces and quadrats, commonly employed in stereotyping, as also metal bars or furniture round the page.† The page is placed in an iron frame, or chase, through the centre of each side of which passes a screw, by means of which the page is compressed and held fast; the intervals, between the sides of the page and the chase, are to be filled up with pieces of wood or metal. The page and chase are now laid upon a perfectly true plate of metal, called the back plate. There is then laid over the page and chase, so that the page occupies the opening, a moulding frame of metal, the back of which is furnished with a pin at each corner, sufficiently long to reach through holes in the back plate, where they are fastened with nuts, screws, or keys: the page is thus firmly fixed to the back plate. On the back of this plate is a groove, which corresponds with a projecting dovetail on the bottom of the striking rod of the casting apparatus, of which the following is a description:—

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* *Repertory of Arts, Manufactures, and Agriculture*, vol. xxxvi. new series, page 69.

† The types, Mr. Applegarth says, should be cast, from a shallow matrice, with a great deal of bevel; by which, I presume, he means, that the slope of the neck should be greater than usual.

From the back of a solid block of wood rises a strong cast iron pillar, from the top and centre of which two arms project (somewhat in the form of a capital F) over the block of wood. Through holes in the extremities of these arms passes the striking rod, to the upper end of which is tied a rope, which, passing over a pulley above, is attached to a wince with a ratchet wheel at the back of the pillar, for the purpose of drawing up the striking rod. The lower end of the striking rod is furnished with a piece of iron terminating in a dovetail, corresponding to the groove on the back of the plate before noticed. To this piece of iron and to the upper arm of the pillar, are fixed the ends of two or more strong elliptical springs, which, being compressed by the winding up of the striking rod, cause by their re-action, when the catch of the ratchet wheel is disengaged, the rod to descend upon the block, and also press it firmly against the block after its descent. The wooden block is furnished with a small flap, or screen, of thin plate-iron, to protect the workman from the splashing of the fluid metal. When used, the striking rod is wound up to about the distance of eight inches from the block, and the back plate with the page and chase are attached to the rod, by means of the groove and dovetail. The workman then takes a small quantity of metal, or an alloy, composed of twenty parts of lead, two parts of regulus of antimony, and one or two more parts of bismuth, in a state of fusion, and pours it into a piece of dry cartridge paper, loosely folded up as a trough, and places it on the block immediately below the striking rod; he gently raises the corners of the paper, and moves the fluid metal towards the centre, that it may attain the same degree of heat in every part; it should also be a little thicker, or heaped, towards the centre. As it becomes cool, and just in the point between fusion and fixity, the workman nimbly disengages the catch, or pall, of the ratchet wheel, when the rod instantly descends by the action of the springs, and causes the type and moulding frame to form an impression on the semi-fluid metal, in the same manner as sealing wax receives the impression of the seal. If the operation has been well performed, a perfect *creux* impression of the type is formed in the metal, which thus becomes a metallic mould, or matrice. The back plate and chase, having the type and mould adhering thereto, are then removed from the striking rod, and the mould is disengaged from the type by gently raising the moulding frame. If the type has not been made with much bevel, it will adhere a little to the mould; this may, in some measure, be prevented by slightly brushing the face of the type over with a little dry soap and red ochre. The mould, now detached from the letter, is taken out of the moulding frame, and the back of the mould is made true by turning, planing, or filing.

The operation of *striking* the stereotype plate is a mere repetition of that of *striking* the mould, substituting the latter for the page of types.—The plate-metal may be the same as the ordinary type-metal, or an alloy of one part regulus of antimony, to three, four, or five parts of lead. The plate may be disengaged from the mould by gently raising the moulding frame; if any difficulty occurs in disengaging the mould from the type, it will be necessary to brush the mould over with dry soap and red ochre, previous to casting the plate. The back of the plate must be turned in a lathe to make it true and parallel to the face.

Mr. Applegarth also applies this process to the polytyping of copper-plates, but this part of his specification is rather obscurely expressed; in order, however, to avoid misrepresentation, I shall copy his words as given in the *Repertory of Arts*, though the first two lines are to me perfectly incomprehensible; but I suppose they are meant to signify, that from a stereotype plate or a copper-plate he can also form a metallic mould.

"I form a mould from a stereotype plate or frame, a copper-plate by placing such plate upon the back plate, with the mould frame, and proceeding in the manner before set forth; and from such mould I cast other plates, in the manner already described; it is be observed that the mould, from a *creux* or copper-plate engraving, is in relief, and that the stereotype plate from such mould is cast with the ordinary type-metal.

"In the application of this my invention to the construction of plates for printing bank or banker's notes, or any printed impressions, wherein difficulty of imitation is a desideratum, I proceed by forming an original plate or block, in which I avail myself both of *creux* and relief engraving on metal, whether performed by hand or by machinery, such as rose-engine or excentric turning, and sometimes I form the original of several or many distinct pieces of engraved metal, which I unite into one page or form, either by soldering at the back, or by locking up in a chase or frame. The original being formed, I strike, in the manner described, as many matrices as may be required; such matrices, being struck from one original, are all perfectly similar, and from these matrices, I again strike the printing plates, which plates being alike, an issue of notes or impressions perfectly similar is secured to any given extent, while the facility of multiplying the plates, enables me to make use of the most complicated patterns or designs."

In conclusion, Mr. Applegarth states, that he does not claim as his invention the union of several kinds of engraving in one original, nor the exclusive use of a metallic mould, but he does claim the exclusive right to make and use metallic moulds or matrices, by casting or striking upon metal, in that state between fusion or fixity, not limiting his patent to any particular apparatus for this purpose, or to any particular alloy of metal.

There must surely be some mistake in this paragraph, as that part of the process, of which Mr.

Applegarth here claims the exclusive right, as his invention, was invented and practised by M. Carez, in France, so long ago as the year 1787, at least as far as regards the forming of such moulds from types, as has been fully shewn in the preceding pages.

When the commission was lately appointed to make enquiries into the possibility of preventing the forgery upon the Bank of England notes, or at least of rendering it extremely difficult, amongst the great number of plans, which were submitted to the consideration of the commissioners and of the directors of the Bank, was one from the above Mr. Applegarth. The last report of the commissioners, which was made only a short time ago, announced, that this plan had been recommended by them, and readily adopted by the directors.* The objects, which they kept in view, say the commissioners in their report, in making the selection on which they determined, were "to enable the Bank to ensure to the public a regular supply of of their notes in sufficient quantity to meet the daily demand, and to have those notes executed in such a manner as shall render them fit for general circulation amongst all classes of society; whilst at the same time, very considerable difficulties are opposed to the art of any person who might be disposed to engage in forging them." Arrangements are now making for carrying this plan into execution; and though the greatest secrecy is very properly preserved respecting it, there can be little doubt, that it is an application, an improved one perhaps, of some part of the foregoing process.

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* It may not be improper to remark, that on the 6th of July, 1820, a petition from Mr. Tilloch was presented to the House of Commons, stating, that he has been informed and believes, that Mr. Applegarth's plan "is in fact the same with, and differs not in the principle and execution from," a plan offered by him to the Directors twenty-three years ago.

It would have been a gratification to me to have had it in my power to have inserted specimens of Messrs. Applegarth and Cowper's stereotype, cast both according to Lord Stanhope's and Mr. Applegarth's process, in order that a comparison might have been instituted between the two modes, but owing to their time being so incessantly occupied at present with the preparations for the issue of the new Bank of England note, my applications for this purpose have not been successful. When their arrangements are completed, they will, I am assured, "be able to exhibit specimens of stereotype casting and printing, which will greatly surprise those who take an interest in these matters."

It is announced in the *Bulletin de la Société d' Encouragement*, for 1819, and from thence copied into the *Repertory of Arts*, for January, 1820,* that, with a view to remedy the inconvenience attending the composing with, and correcting of, the hollow-faced types used in the process invented by Herhan, a M. Poterat (probably Poteral) has formed a set of types, which are hollow on one end, and in relief on the other. Each type is formed of two pieces, neatly soldered together; one of which is of copper, bearing the impression of the letter on its end, the other of type-metal, bearing the letter in relief and reverse. With these types the subject is composed in the usual way, with the relief end of the type turned upwards, and the difficulty and expense of composing with hollow-faced types are thus avoided. When two lines are composed, a plate is *struck* from them with the hollow end of the types. Only two lines are *struck* at a time for the purpose of facilitating corrections, as in this case a defective letter in either line may be easily removed with a file, while to do so in a whole page would be difficult, and would require expensive tools. M. Poterat uses a wooden machine for *striking*, the expense of which is about 30s. whilst the usual machine for this purpose is very expensive; the tool for stamping the copper costs about 8s.—I know not what success has attended this method, but I feel strongly inclined to doubt its being any improvement on the process of Herhan.

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* Vol. xxxvi, second series, page 123.

In the latter end of the year 1819, the process, which had been for some time practised in America, of polytyping engraved plates by means of hardened cylinders of steel, was, under the name of *siderographia*, introduced into this country by Messrs. Perkins and Fairman. Soon after their arrival they associated themselves with Mr. Charles Heath, the celebrated engraver; and have since issued some specimens of their art and united talents, which, on account of the clearness and accuracy, with which the most delicate engravings and elaborate engine work are rendered, have excited the surprise and admiration of the public. With one of these specimens I am enabled to present the reader. The following account of the process, by which it is produced, and sketch of the purposes, to which the art may be made available, are extracted from the *Monthly Magazine*, for May, 1820.*

“ The advantages to be derived from the use of this invention are various; but that to which it has been applied almost exclusively, and with perfect success, has been to SECURE PAPER CURRENCIES FROM FORGERY. Having been permitted to examine the siderographic process, we proceed to lay a concise account of it before our readers. Steel blocks or plates of sufficient size to receive the intended engraving are softened or decarbonated upon their surfaces, and thereby rendered a better material for receiving all kinds of work than even copper itself. After the intended work has been executed upon the block, it is then hardened with great care by a new process which prevents injury to the most delicate work.—A cylinder of steel previously softened is then placed in the transferring press, and repeatedly passed over the engraved block by which the engraving is transferred *in relief* to the periphery of the cylinder, the press having a vibrating motion equalling that of the cylinder upon its axis, by which new surfaces are presented equalling the extent of engraving. This cylinder is then hardened, and is ready to indent either copper or steel plates, which is done by placing it in the same press before described, and repeatedly passing it over the copper or steel plates, thereby producing another engraving *identically* like that upon the *original* block; and this may be repeated upon any required number of plates, as the original engraving will remain to produce other cylinders if ever required, and when transferred to steel plates and hardened, these will also serve as additional matrices for the production of new cylinders.

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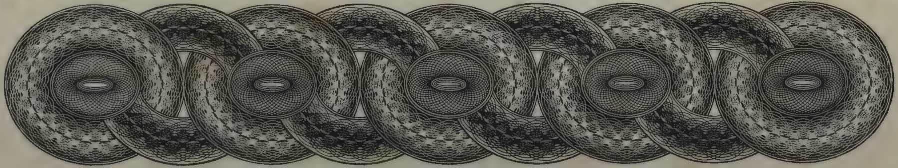
* Vol. xliv. page 346.

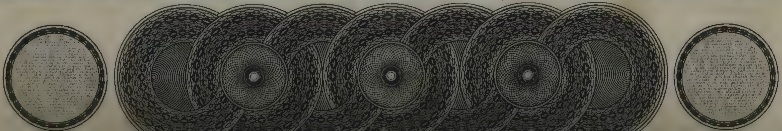
"This invention promises to be of great advantage to some of our manufactures, particularly that of pottery, which may now be embellished with beautiful engravings, so as to place the successful competition of other nations at a more distant period. It may also be applied with great advantage to CALICO printing, by producing entire new patterns upon the cylinders from which they are printed, an object of great importance to our manufacturing interest. These are among its obvious applications; but as a means of rendering Forgery IMPRACTICABLE, it claims the attention of statesmen and the gratitude of philanthropists."

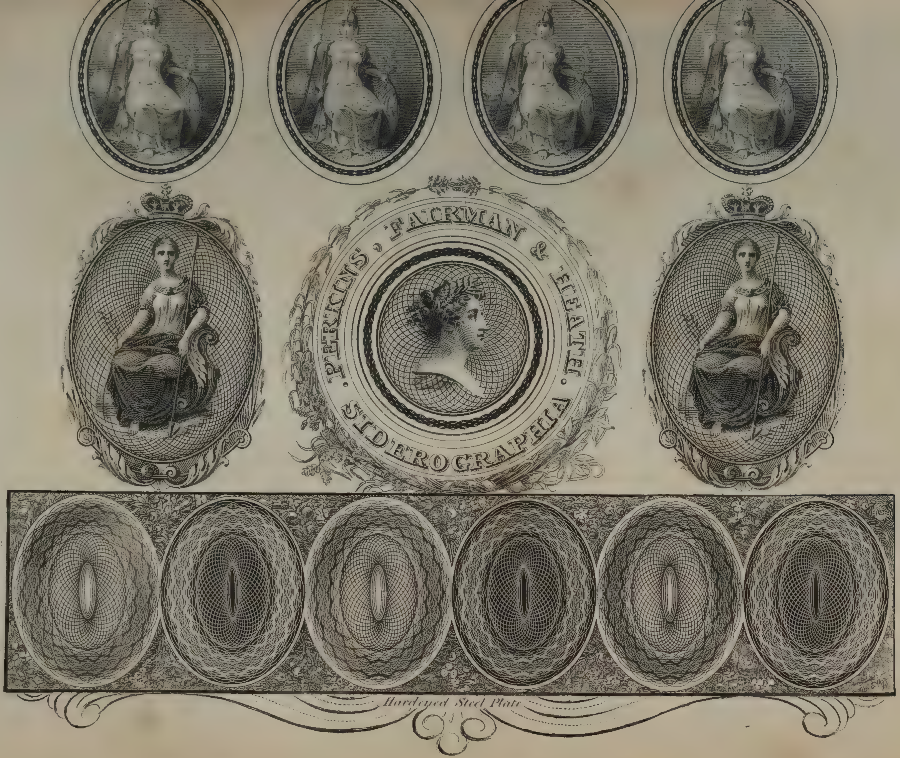
The notice of this process has brought down this enquiry to the present time; I shall, therefore, conclude this part of my Essay with a description of the accompanying plate, an examination of which must convince every one of the extreme difficulty, not to say impossibility, of forging bank notes, on which this process shall be employed.

This plate contains fifteen figures, which we may conceive numbered from 1 to 15, as they stand upon the plate.

Fig. 1. and 2. are the same subject repeated, to






PERKINS, FAIRMAN & HEATH.
SIDEROGRAPHIA.
Hardened Steel Plate

shew that they are not mere copies of each other, but perfectly identical, being both the product of the same impression on the steel cylinder.

Fig. 3. is a line engraving, I believe, by Heath.

Fig. 4. and 6. and the border round Fig. 3. are scroll or engine work, done by a peculiarly constructed machine. It will be seen that in the alternate coils of the chain in Fig. 4. the lines, which are black in the one are white in the other, an effect similar to copper-plate and letter-press printing combined. The border of Fig. 3. is also an imitation of block or letter-press printing.

Fig. 5. and 7. contain the Creed and Lord's Prayer, engraved by B. Davies.

Fig. 8. and 11. are fac-similes of a figure of Britannia from the same steel cylinder.

Fig. 12. 13. and 14. shew how the line engraving may be combined with the engine work.

Fig. 15. is a splendid specimen of the engine work, relieved with engraving; the 1st. 3d. and 5th. ovals represent copper-plate engraving, and the 2d. 4th. and 6th. block or type printing, the lines in the former being *en creux*, and in the latter in relief. This imitation of block printing is certainly the most curious part of the whole process, and if really engraved upon the original steel plate with a machine, as has been stated, is most surprising;

but I suspect, that it is either the effect of an operation more, or an operation less, than the other parts of the plate,—it is either produced in the original plate by an *en creux* engraved punch or cylinder, or else is engraved upon the cylinder, before or after the other parts of the original plate are impressed upon it, in either of which cases the great difficulty ceases.

* * *

Having thus traced the progress of stereotype printing from its first origin to the present time, when it appears to have attained to so great a degree of perfection, it only remains to enquire, whether the advantages, with which the practice of the art was so confidently expected to be attended, have been derived from it. That those advantages were expected to be very great, has been sufficiently shewn, I think, in the preceding pages, though I have purposely abstained from giving insertion to much of the glowing language, in which their anticipations of advantage were expressed by each of the inventors and exercisers of the art; and I felt this to be the more unnecessary, as most of the readers of these pages will, no doubt, recollect the very confident manner, in which, on its late revival in this country, it was asserted, that such unparalleled advantages, both to the buyers and sellers of books, would arise from the practice of the art; experience, however, I am afraid, has shewn that these advantages have at least been greatly overrated.

The principal advantages, which were expected to accrue from the adoption of stereotype printing to the bookseller, were, first, the power of being able to print, as often as desirable or convenient, editions of standard books, suited in point of extent to the demand for them within short intervals of time, and thus avoid the great advance of capital required for large editions; and second, the exemption from the heavy charges of composition and reading, on all editions subsequent to the first.—The first of these advantages seems to have been attained as fully as could possibly be expected,—stereotype printing having furnished the bookseller with the means of printing editions as limited in extent, and consequently as often, as may suit his pleasure or convenience; but it may well be doubted, whether the trouble and delay, which must necessarily arise, from being so often, and perhaps unexpectedly, called upon to give orders for paper and for the printing of the work, and from the paper not being supplied, nor the work being able to be put to press, at the precise moment when wanted, may not in a great measure counterbalance this advantage, at least any that can possibly arise from editions suited to very short periods of time. The exemption from the heavy charges of composition and reading has also been attained, but unfortunately for any prospect of advantage it is attained at so very great an expense, as to render it in a great measure nugatory. For all the processes for casting stereotype plates, which have yet been invented, are attended with so various and nice manipulations, and require such large and expensive apparatus, that the plates have not hitherto been furnished, except at a cost greatly exceeding that of the composition of any single edition, and consequently requiring the lapse of many years, and the savings accruing from the printing of more than one edition, before the original expense of casting the stereotype plates can even be defrayed, much less that their use can become a source of profit.—This is the rock, upon which the hopes of all the inventors and practisers of the art, on their own account, have been wrecked; for knowing that the cost of composition and reading formed so very heavy a part of the expense of printing, they have suffered their minds to be dazzled by the brilliant appearance of a plan, which promised to save these very heavy charges, totally regardless of the fact, necessarily inherent in the very nature of stereotype printing, namely, that it *never* can be made a source of *present profit*. So far, indeed, is this from being the case, that its certain tendency is to decrease present profit, by the addition of another, and that a very expensive, operation; whilst the only possible way in which it can prove a source of profit, is by the saving of expense and advance of capital, at some distant period of time. The length of time, that must elapse, before such advantage can be derived from stereotype printing, must, of course, be of longer or shorter duration, according to the expense, with which the casting of the plates is attended; but according to the present regular charge for casting stereotype plates, that time must be equal in point of duration to that, in which from two to three editions of the usual extent, according to the regular mode of printing, would be required, as will be shewn hereafter. After this period has elapsed, it will then indeed be found to be attended with considerable advantage, not arising, however, so much from the saving of expense, as from the saving of capital, and consequently of interest.—It would hence appear, if my view of the subject be correct, that stereotype printing, can only be advantageous, when applied to books, which promise to be attended with an extensive sale even after three editions of the accustomed size have been disposed of; and these books must moreover be of such a nature, as to require little or no alterations in the text, for the greatest alteration, that even the recasting of a plate admits of, is such a one as can be comprised within the exact same number of lines. The number of books, therefore, to which stereotype printing may be successfully applied, must be limited.

The advantages, which were promised to the public from the adoption of this art, were, that books would in consequence be rendered both more correct and cheap. It is certainly very true, that stereotype plates do afford the means of correcting any literal or verbal errors, that may have escaped observation on a first reading, whenever they may be discovered, and thus books may be rendered gradually quite correct;—but what security have the public that this will be done? None whatever: On the contrary, there is great reason to fear, that not only will not these corrections be made, but that the accidents, which must inevitably occur every time that the plates are used, will neither be noticed nor amended, as so doing would be attended with expense;—and books instead of being rendered more correct, will thus be rendered more faulty.—The public, however, are by this time, I believe, pretty well satisfied, that a stereotype edition is by no means a security against error.—As to books being rendered cheaper, the above remarks will, I think, shew that there is very little probability of that, and certainly this advantage has not as yet been experienced. An attempt, was, indeed, made to publish some stereotype editions at a cheaper rate than the corresponding editions printed according to the usual method, but this apparent cheapness was effected by using a much smaller type and closer page, thus causing a great saving in paper and in presswork, as such works would, of course, be comprised in a smaller number of pages; it must be evident to every one that the price of a book could be reduced in a similar manner by ordinary printing. But if the use of stereotype is to render books cheaper, where, it may be asked, will be the advantage of it to the bookseller? The futility of this assertion will, however, be sufficiently shewn from the subsequent calculations.

From the circumstance of some of the earlier productions of this art having been formed from types of a handsome shape, and great care having been taken with the printing of them, an opinion at one time very generally prevailed, amongst those unacquainted with the art, that stereotype printing possessed some peculiar and great excellence, not attainable by the usual mode of printing. This opinion, it must be unnecessary to state, is quite erroneous, and that there can be no doubt, that with equal care, works can be printed in a superior manner by the ordinary method. Stereotype printing can never excel this method, for the utmost point of perfection, to which it can by possibility arrive, is to equal the customary mode of printing.

That I may not be accused of partiality, I shall lay before the reader the statements which have been made in favour of stereotype, and then proceed to make such observations upon them as have been either suggested by others, or have occurred to myself.

Upon the revival of the art in this country about 18 years ago, the most flattering assurances of the many great advantages, with which the practice of it would be attended, were most confidently made; and supported as these assurances were by the apparent success, with which the art was at that time prosecuting in a neighbouring country, a very general prepossession was created in its favour.—After the experience of a few years, however, doubts appear to have arisen respecting it, for in the *Monthly Magazine*, for April 1807, there appeared the following paragraph:

"Stereotype printing has not been adopted by the booksellers of London, because it does not appear that more than twenty or thirty works would warrant the expense of being cast in solid pages; consequently the cost of the preliminary arrangements would greatly exceed the advantages to be attained. On a calculation, it has appeared to be less expensive to keep certain works standing in moveable types, in which successive editions can be improved to any degree, than to provide the means for casting the same works in solid pages, which afterwards admit of little or no revision. As the extra expense of stereotyping is in all works equal to the expense of seven hundred and fifty copies, it is obvious that this art is not applicable to new books, the sale of which cannot be ascertained. Although these considerations have induced the publishers of London not to prefer this art in their respective businesses, yet it has been adopted by the Universities of Cambridge and Oxford; and from the former some very beautiful editions of Common Prayer Books have issued to the public; probably the art of stereotyping applies with greater advantage to staple works of such great and constant sale, as prayer-books and bibles, than to any other."

It was not to be expected that so very disparaging a statement should pass without some answer; accordingly in the next number of the same Magazine, the following counter-statement appeared on the part of Mr. Wilson.

"In this statement there are several mistakes, calculated to mislead the public mind. It is due from me, not to the *Booksellers of London* particularly, but to the Booksellers and to the PRINTERS too, of England, Scotland, and Ireland, to the Masters of public schools and private seminaries, to the Governors of Institutions for the gratuitous circulation of books, to all persons interested in the faithful and economical education of youth of both sexes, and in general to the whole literary world,—it is due from me to bring forward something more than bare assertion upon the present occasion; to state what really are the advantages peculiar to stereotype printing, which I presume I am rather better qualified to do than are those persons who know nothing of the subject.

"In the first place, the *wear of moveable types*, in stereotyping, does not exceed £5. per cent. of the heavy expense incurred by the old method of printing.

"2dly. The expenditure upon *composition* and *reading* is nearly the same by both methods, for a first edition: but this great expense must be *repeated* for *every* succeeding edition from moveable types; whereas, by the stereotype plan *it ceases for ever.*

"3dly. The expense of *stereotype plates*, when I am employed to cast them, is not £20. per cent. of that of moveable type pages.

"4thly. The expenditure upon *paper* and *press-work* is the same by both methods; but it is not incurred at the same time. The old method requires an advance of capital for a consumption of four years; whereas, by stereotype, half a year's stock is more than sufficient. It follows, therefore, that £12½. per cent. of the capital hitherto employed in paper and press-work is fully adequate to meet an equal extent of sale.

"5thly. A fire-proof room will hold stereotype plates of works, of which the dead stock in printed paper would require a warehouse twenty times the size; and thus *warehouse-rent* and *insurance* are saved; with the additional advantage, in case of accident by fire, that the stereotype plates may be instantly put to press, instead of going through the tedious operation of moveable type printing; and thus no loss will be sustained from the works being out of print.

"6thly. In stereotype, every page of the most extensive work has a separate plate; all the pages, therefore, of the said work, must be equally new and beautiful. By the old method, the types of each sheet are distributed, and with them the succeeding sheets are composed; so that, although the first few sheets of a volume may be well printed, the last part of the same volume, in consequence of the types being in a gradual state of wear as the work proceeds, will appear to be executed in a very inferior manner.

"7thly. The stereotype art possesses a *security* against *error*, which must stamp every work so printed with a superiority of character that no book from moveable types ever can attain. What an important consideration it is, that the inaccuracies of language, the incorrectness of orthography, the blunders in punctuation, and the accidental mistakes that are continually occurring in the printing of works by moveable types, and to which every new edition superadds its own particular share of error,—what a gratifying security it is, that all descriptions of error are not only completely cured by the stereotype invention, but that the certainty of the stereotype plates remaining correct, may be almost as fully relied on as if the possibility of error did not at all exist!

"8thly. Stereotype plates admit of alteration; and it will be found that they will yield at least twice the number of impressions that moveable types are capable of producing.

"Lastly, All the preceding advantages may be perpetuated, by the facility with which stereotype plates are cast from stereotype plates.

"From the whole it results, that a saving of £25. to £40. per cent. will accrue to the public in the prices of all books of standard reputation and sale, which, I believe, are pretty accurately ascertained to comprehend THREE-FOURTHS of all the *book* printing of England, Scotland, and Ireland."

This statement certainly draws a most flattering picture of the advantages of stereotype printing over the usual method, and could these advantages be realised there can be no doubt that the art would deserve to be considered as a most valuable improvement; but I am afraid, that, even after making all due allowances for the sanguine expectations of an artist in a newly-revived, and almost hitherto untried, art, very few of these confident assertions will prove to be founded in fact.

1. The first advantage enumerated in this statement I must confess myself at some loss to understand, for it surely never could have been intended by Mr. Wilson to state, that the moveable types, used for making stereotype plates from, would last twenty times as long as those used in printing. Such a circumstance is quite incredible, and is, moreover, inconsistent with the fact, for it has been found from experience, that the types, even with the greatest care, wear quite as fast in stereotype as in common printing. Indeed, as Mr. Brightly justly remarks, if the pulling of proofs, brushing and washing of forms, distributing, &c. be the principal causes of wear, it follows, that stereotype printing, in which the brush is much more used, and the other operations not diminished, can have little to boast of as to the saving of the letter. Mr. Brightly seems to consider this assertion of Mr. Wilson as implying, that from five pounds worth of types it might be possible to cast plates, which would print off as many impressions as it usually requires moveable types to the amount of an hundred pounds to do. This is certainly possible; but if it requires half as much letter to keep any given number of compositors at work upon stereotype as on

common printing, it is really futile to talk of only five pounds worth of letter being required, when in fact at least fifty pounds worth are necessary. With five pounds worth of letter it would also be possible to print works in the common way, which would properly require one hundred pounds worth, as has indeed been done by some private individuals, but such a mode of doing business in a printer would be quite ridiculous.

Stereotype printing does certainly, at first view, hold out an apparent facility to persons of limited capital, of enabling them to publish works with only a very small quantity of letter; and could an easy and cheap process be discovered, and such as did not require any peculiar kind of type, it would no doubt prove of great advantage to such, particularly to those country tradesmen combining the businesses of printer and bookseller, and who, owing to their distance from all letter-foundries, are often put to great inconvenience, especially when a work runs much upon any particular sorts. But if the original expense of fitting up a foundry amounts to £250. or £300. and the cost of casting plates is so very great, the capital necessary for these two objects might equally as well be expended in the augmentation of their founts, and probably with more advantage.

2. The expression, that " the expenditure upon composition and reading is *nearly the same* by both methods, for a first edition," admits, that there is a difference. As every page is imposed singly, and as the letter is rendered greasy and troublesome to distribute and compose, an additional allowance is always made to the workmen who are employed upon works intended to be stereotyped. This allowance varies, I believe, in different offices; in some offices one-half extra has been paid, but the regular charge I understand to be one twenty-fourth. If it is intended that stereotyped books should really possess a superior degree of accuracy, of course more pains must be taken with them in the reading, and this cannot be done without

incurring a greater expense. The expense of composition will certainly cease after a first edition; but how are after-errors to be either discovered or corrected, without future inspection and correction, and consequently without a future expense. "The expenditure, therefore," as Mr. Brightly says, "for reading and after corrections, cannot be nearly the same" as in common printing without leaving the works *nearly* as incorrect.

3. The expense of casting stereotype plates is not wholly or fairly stated in the 3d position. The charge of £20. per cent. is merely for the metal plate; but besides this, there is also the expense of the composition and reading of a page, with the printer's profit upon them. The plate is then charged at the rate of one-fifth of the value of the page of types, from which it has been formed. As a plate weighs about the fifth of the page of types, to say that the expense of a stereotype plate is £20. per cent. of that of moveable type pages, is, therefore, only an obscure mode of stating, that stereotype plates are furnished at the same rate per pound, as the type-founder charges for the kind of types from which they are formed. Many other stereotype founders adopted the same mode of charging as practised by Mr. Wilson; but the more general method, at present, is to charge the composition and reading, as in the common method, and then to make a charge of 40s. per sheet of all sizes, for the casting of the plates. So high as 70s. and 80s. have been paid.

4. The fourth position is certainly imposing, and does, I am inclined to think, include the chief advantage of stereotype printing, but that is not to the extent here stated.—The price of presswork is not the same on stereotype as on common printing. For the harder pull the plates require, the longer time necessary to make ready a form, and the time lost in arranging the plates on the press, in waiting till defects are discovered and till repairs are made, are all losses to the pressman, for which a compensation must be made. This compensation is generally

1s. or 2s. per form; or 1d. or 1½d. per hour.—That 12½ per cent. of the capital hitherto employed is sufficient to meet an equal extent of sale is incorrect; for though it may only be necessary to print half a years' stock at one time, yet as six months' credit must be given, capital must, of course, be found for a years' sale, so that 25 per cent. of the hitherto employed capital will be required, instead of 12½. Such a saving of capital, however, is certainly a great advantage, which will be found to be derivable from stereotype printing, after the original expense of the plates has been defrayed. That this saving of capital is in fact the only important advantage of stereotype, will be evident from the subsequent calculations, for if we discard the interest, it will be found, that the saving of expense by stereotype is scarcely worth notice; indeed it must be evident, that the expense of repairs and charge for extra presswork must in a great measure counterbalance any advantage arising from the saving of composition and reading.

5. The advantage detailed in the 5th. position, I am ready to admit; but it should be stated, that as the bookseller requires his printer to find warehouse-room, without charge, for the plates, the expense of such fire-proof room must be added to the original expense of fitting up a foundry.

6. If, as has been proved by experience, types wear quite as fast, when used for forming stereotype plates, as they do in ordinary printing, it must be obvious, that the advantage, named in the 6th. position, cannot belong to stereotype printing.

7. What *security* the stereotype art possesses against error, I am utterly at a loss to conjecture, for the readers of stereotype proofs are certainly no more infallible than those of other proofs, and, therefore, errors are as likely to escape notice on one occasion as the other. When very great care has been taken with the reading of a work, there is certainly a reasonable assurance that such will continue correct; and it is also certainly possible, that verbal and literal errors, which have escaped observation on

the first readings, may be corrected, whenever they are discovered; but as such greater degree of care in reading, the discovery of errors (unless by accident), and the correcting of them, will be attended with expense, is there not great reason to fear, the only recommendation of stereotype being the saving of expense, that this extra care will not be taken, nor the errors discovered or corrected. There is also great reason to fear, if the revises be not very carefully examined, that the accidents, which must almost inevitably occur every time the plates are used, will not only be never observed, but in all probability perpetuated through subsequent editions. If stereotype editions of books be examined, it will be found that this is no groundless fear, for the pages are generally full of imperfect letters, and many words are rendered dubious from the ascending and descending strokes of letters being broken off, by which an *h* is made into an *n*, a *y* into a *v*, &c. This is a fault to which stereotyped books are particularly liable; and it cannot indeed well be otherwise, when it is by no means an uncommon occurrence in the trade to work the plates as long as they are readable, before any repairs are made in them. What then becomes of the security against error, or of the certainty of books remaining correct?—That too many errors escape notice in all books, is certainly to be lamented, but the benefit derived by the public from the exertions of that laborious class of men, the readers for the press, should not be estimated lightly, or their feelings hurt by thoughtless censure. There are few authors, who have not experienced the benefit of their assistance, and it would be a more just requital of their labours, rather to feel thankful to them for what they do perform, than to blame them for what they have omitted. There is certainly a possibility that the errors of a first may be continued in a second edition, but I appeal to every one connected with the press, whether there is not as great a possibility that those errors may be corrected

8. Stereotype plates may certainly be altered, but for this purpose the page must be set up again and a new plate cast; and even then the greatest alteration, that such recasting admits of, is such an one as can be contained in the same number of lines. Insertions may also be made, provided the insertion is neither more nor less than a full page or pages; but this would require the folios of all the subsequent pages to be altered. The size and style of the page, when once adopted, can never be altered. As stereotype plates are composed of the same metal as types, it seems scarcely possible that they can yield twice the number of impressions. As the letters are immoveable, and thus exempt from the injury sustained from frequent distribution and composition, they will probably yield more impressions than types, which are exposed to those operations, but certainly not more than types which are not exposed to them. I have heard from good authority, that from the forms of a bible, or testament, the types of which are kept constantly standing, at the University of Cambridge, no fewer than 500,000 copies have been printed. I doubt if stereotype plates could print more.

The facility of casting stereotype plates from stereotype plates has been objected to, as affording an opportunity for fraud; as to admit this, however, would be in fact to cast a doubt upon the honour of the stereotype printers, I shall pass it over unnoticed.

Mr. Wilson's concluding assertion that a saving of £25. to £40. per cent. will accrue to the public in the prices of all books of standard reputation and sale, has been combated at some length by Mr. Brightly, who has entered into a variety of calculations to shew the little probability there is of such a circumstance taking place. These calculations, are made upon the supposition that the plates are charged according to Mr. Wilson's estimate of £20. per cent. of the value of the types. The result is very unfavourable to stereotype printing, as whether the book be printed on pica or nonpareil, the original cost of the plates will not be defrayed till after the sale of more than three editions, and the saving in the price of each book can never be to the extent stated by Mr. Wilson. As, however, a different method of charging for the plates now generally prevails, much more favourable to stereotype, especially when the works are printed on small letter, I shall not copy these calculations, but insertothers more consonant to the present practice of the trade. They will, I think, materially tend to give a proper view of the advantages and disadvantages of stereotype printing.

I shall suppose, that a bookseller wanted to print a work of twenty sheets octavo, on long primer letter, of which he sold on the average 1000 copies annually; and examine what advantages or disadvantages will result from an impression of 4000 copies, the common way, to last four years, and the same work on stereotype, 500 copies every six months, allowing the paper, in both cases, to cost him 30s. per ream.

PRICE OF COMMON PRINTING.

	£.	s.	d.
Composing by the scale price, at 21s. with profit thereon, - - - - -	31	10	0
Reading and profit on it, - - -	7	17	6
Presswork at 5d. or 8s. per ream, - -	64	0	0
Total charge for printing, - -	103	7	6
160 reams of paper, at 30s. - - -	240	0	0
Cost price of 4000 copies, - -	343	7	6

To this must be added the interest of money; but as the bookseller is supposed to have one-eighth of his stock returned every six months, the interest on £343. 7s. 6d. is not to be charged for the whole four years, but only on such parts successively as remain unsold;—it may therefore be estimated thus:—

	£.	s.	d.		£.	s.	d.
For the first six months, -	343	7	6	=	8	11	8¼
Next ditto, seven-eighths unsold,	300	9	3¾	=	7	10	2½
Ditto, six-eighths unsold, -	257	10	7½	=	6	8	9
Ditto, five-eighths unsold, -	214	12	2¼	=	5	7	3¾
Ditto, one-half unsold, -	171	11	8	=	4	5	10
Ditto, three-eighths unsold,	128	15	3¾	=	3	4	4½
Ditto, one-fourth unsold, -	85	16	10½	=	2	2	10¾
Ditto, one-eighth unsold, -	42	18	5¼	=	1	1	5¼
Amount of interest, - - -					38	10	6
Cost price of 4000, - - -					343	7	6
Total for a four years' consumption,					381	18	0

Let us now calculate the expense of the same work in the stereotype manner, six months' consumption being printed at a time.

PRICE OF STEREOTYPE.

	£.	s.	d.
Composition (a farthing extra) 22s. with profit,	33	10	0
Reading, with profit on it, - - -	8	5	0
Presswork on 500, at 6d. or 10s. per ream, (though 12s. has been regularly paid for 500) -	10	0	0
Expense of printing, - - -	51	5	0
Casting of plates at 40s. per sheet (Mr. Wilson's estimate would be at least 70s.), - -	40	0	0
Twenty reams of paper at 30s. - -	30	0	0
	121	5	0
Interest for six months, - - -	3	0	7½
Cost of first 500, - - -	124	5	7½

Second Edition of 500.

	£.	s.	d.
Paper, - - - - - -	30	0	0
Presswork, as before, - - - -	10	0	0
	40	0	0
Interest for six months, - - - -	1	0	0
Ditto on composition, reading, and plates, expended on first edition, - - - -	2	0	10½
Cost of second 500, - - -	43	0	10½
Multiply this seven times - - - -			7
	301	6	1½
Add cost of first edition of 500, - - -	124	5	7½
Price of 4000 by stereotype printing,	425	11	9
Ditto by ordinary printing, - -	381	18	0
Balance against stereotype at the end of 4 years,	43	13	9

SECOND EDITION OF 4000.

The money, expended on the composition and reading of the first stereotype edition, will now have been nearly returned; interest, therefore, ought only, in the subsequent editions, to be charged for the balance remaining due at the end of the first four years; but as the plates will have been some time in use, a charge will now begin to be made for repairs, &c. The expense of the subsequent stereotype editions of 500 will therefore stand thus:—

	£.	s.	d.
Paper, - - - - -	30	0	0
Presswork as before, - - -	10	0	0
Repairs, at the lowest, - - - -	1	0	0
	41	0	0
Interest for six months, - - -	1	0	6
Interest of balance of £43. 13s. 9d. for six months,	1	1	10

	£.	s.	d.
Cost of every 500 of second 4000,	43	2	4
			8
Cost of second 4000 by stereotype	344	18	8
Ditto by the usual method, as before,	381	18	0
Balance in favour of stereotype on second 4000,	36	19	4
Deduct this from the balance remaining after the first 4000, - - - -	43	13	9
Balance against stereotype after 8 years, - -	6	14	5

THIRD EDITION OF 4000.

				£.	s.	d.
By the ordinary method, as before, - -				381	18	0
By stereotype,—Paper, - -	£30	0	0			
Presswork, - - - -	10	0	0			
Repairs, &c. now increased, - -	1	10	0			
	41	10	0			
Interest for six months, - -	1	0	9			
Ditto, for balance of £6. 14s. 5d.		3	4¼			
	42	14	1¼			
			8			
Cost of third edition of 4000,				341	12	10
Balance in favour of stereotype on third 4000,				40	5	2
Deduct from this, balance remaining, - -				6	14	5
Balance in favour of stereotype at the end of 12 years, - - - - -				33	10	9

So that from this calculation (which I do not know to be incorrect) it appears, that it will not be till the tenth year that any profit can be derived from stereotype printing. And that after all charge shall cease on account of the original cost of the plates, the expense of each edition of 500 will be about £42. 10s. or £340. for 4000 copies, leaving a balance in favour of stereotype of £41. 18s. on every 4000 copies, or about 2½d. per book, which includes all advantages arising from any saving of capital. Since, therefore, no greater a saving than 2½d. per book is derivable from stereotype printing, it must be evident to every one, that Mr. Wilson's assertion, that a diminution of £25. or £40. per cent. will arise in the price of books can never be realised. This calculation, to be sure, is made on the supposition, that an extra charge is made for composition, and that 6d. per hour must be paid to have stereotype plates worked as well at press as common forms can be for 5d., or some other allowance for extra trouble given to the pressmen; if no extra charges of this nature are indeed made, the advantages in favour of stereotype will be considerably increased, and the expense of the plates a great deal sooner repaid. But stereotype printing has been hitherto subject to these charges, even greater than what I have stated; and they are yet, I believe, regularly made, though I am aware, that owing to the extreme depression, under which the printing trade in London is at present labouring, it is by no means difficult to get stereotype plates worked at the same price as common matter, both the masters and the workmen choosing rather to make a sacrifice of part of their fair remuneration, than be left without employment. This state of things, however, can only be temporary, and must be considered rather as the exception to the general state of the trade, than the basis upon which any calculations should be founded. When the present ruinous competition in the trade shall have ceased, from the retiring of some, the death of others, and the failure, perhaps, of but too many, and when the trade shall have accommodated itself to the new circumstances in which it is placed, there can be no doubt that the common mode of printing will again acquire its advantages over stereotype, with regard to the price of presswork; as it is impossible, that, whenever any thing like free will can be exercised, stereotype plates can be worked for the same price as common matter, for the trouble attending them is *infinite.*

The above calculations are made upon a book printed on long primer, as being a fair medium size; with smaller sized type, the advantages in favour of stereotype will be greater; for when the composition and reading of a sheet amount to more than 40s. the expense of plates will be defrayed by the second edition of 4000.

It has been stated that the advantage of stereotype arises principally from the saving of capital and interest; this will be rendered apparent by the following brief recapitulation of the preceding statement, discarding all calculations of interest.

				£.	s.	d.
Cost of 4000 copies by ordinary printing, -				343	7	6
Ditto by stereotype, first 500, -	121	5	0			
Seven subsequent do. at £40.	280	0	0			
				401	5	0
Balance against stereotype at end of 4 years				57	17	6

Second Edition of 4000.

	£.	s.	d.
By ordinary printing, as before, - - -	343	7	6
By stereotype, 8 editions of 500, at £41. -	328	0	0
Balance in favour of stereotype on 2d. 4000,	15	7	6
Deduct this from former balance, - - -	57	17	6
Balance against stereotype at end of 8 years,	42	10	0

So that at the end of eight years there is still remaining against stereotype a balance of £42. 10s. which will require about eleven years more to clear; and each edition of 4000, after the lapse of nineteen years, will leave a profit of £15. 7s. 6d. only.

Mr. Brightly enters into a similar calculation to prove that on long numbers the stereotype system of printing is absolutely disadvantageous; but it is, I think, unnecessary to follow him, as it must be evident to every one, that where any thing extra is paid for presswork, such extra charge must, when the numbers are great, soon counterbalance any advantage arising from the saving of composition.

I would not, however, wish the preceding remarks to be received as a total condemnation of stereotype printing, for I think, that even as at present conducted it is productive of some advantages, which would be found to be considerably increased, were the adoption of the art attended with less expense. For I agree with Mr. Brightly, that "if a substitute could be found for oiling and brushing the pages, so as not to wear the type, or increase the trouble of the compositor," or if a more simple and cheap process could be discovered, so that the plates might be furnished at a considerably less expense;—and if the plates "could be cast so true that they might go to press and be worked with the same ease and expense as moveable types,"—"several advantages would result from the introduction of stereotype." Could this be accomplished, it might, I think, be applied with advantage to the following class of books:—

1. To books published in parts or numbers.—Purchasers very frequently take parts of such publications, and not the whole, by which the set becomes broken and uneven, and great loss is incurred by the waste of paper. But this might be prevented by the use of stereotype, which greatly facilitates the perfecting of any parts or numbers that may be deficient. Stereotype printing is already extensively applied to this class of books.

2. To stock books, the sale of which is certain to continue through several years, and which will not require any alteration, especially those printed on small letter.

3. To all standard books, of which the composition is above the usual price of composition,—such as all table and figure books, grammars, dictionaries, spelling books, &c. On these the saving will be considerable.

Whether it be owing to the adoption of stereotype printing having been really found to be attended with advantage, or whether to great advantages being only expected from it, I know not, but it is certain, that it is now adopted to a great extent by the London booksellers, who are disposed to entertain a favourable opinion of it. This adoption of the art, in conjunction with some other innovations, is now making a great revolution in the trade, to the great injury of the regular printers. If great advantages are really derived from this art, it would be too much either to expect or request, that they should be relinquished out of consideration to any class of individuals. But it is sincerely to be hoped, that the bookseller will take care to be thoroughly convinced, that the expected advantages are decidedly certain and unequivocal, before, by the adoption of stereotype printing, he willingly abandons to misfortune, perhaps to ruin, those who have either embarked their capitals in, or spent the best part of their lives in the endeavour to attain such a proficiency, as may enable them to execute in a proper manner, a certainly nice and difficult art, and one which has conferred such inestimable benefits on society.

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DIRECTIONS TO THE BINDER.

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B. P. L. Bindery,
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